MODEL AIRPLANE NEWS

DECEMBER 1956 — 35 CENTS

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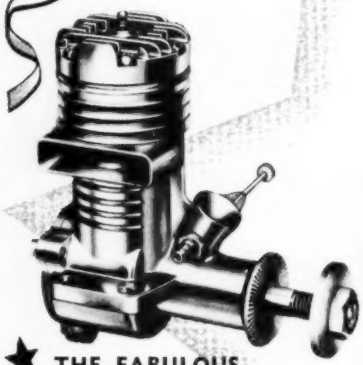
The World's most powerful racing 29.



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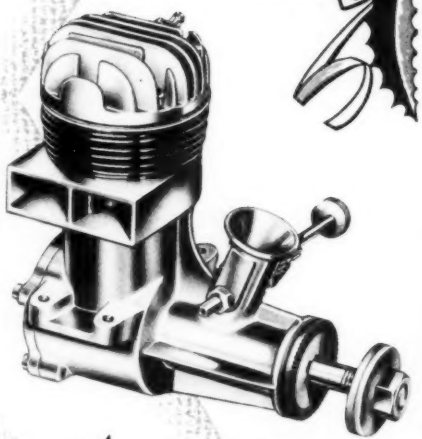

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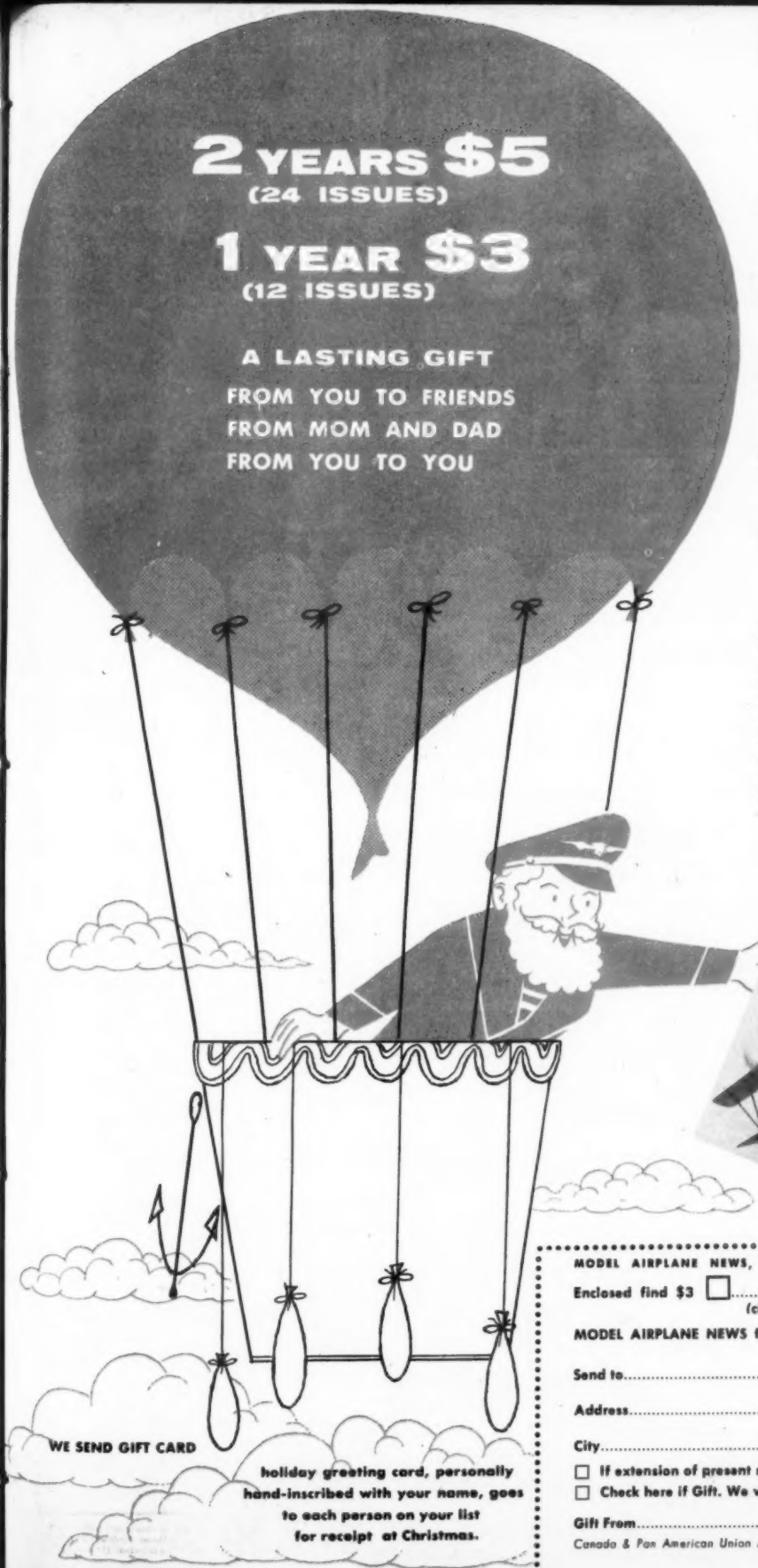

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Contest Calendar

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NOVEMBER

4—*Dallas, Tex.:* Class AA Cliff Model Club 4th Quarterly Contest for FFG. Joel B. Hargis, Contest Director, 1102 W. Saner Ave., Dallas, Tex.

11—*Inglewood, Calif.:* Class AA Skywolves' Team Race. Don C. Crystal, C.D., 805 E. Palmer Ave., Compton, Calif.

11—*Bakersfield, Calif.:* Unlimited Rubber Record Trials. Mathew J. Puskarich, C.D., 1917 Esther Drive, Bakersfield, Calif.

18—*Tulare, Calif.:* Tulare Sky Kings Record Trials for all free flight classes. Don Peacock, C.D., 912 Apricot St., Tulare, Calif.

18—*Pomona, Calif.:* Class AA Rat Race and Balloon Bursting Contest. Bernard C. Swartz, C.D., 1109 South Plum, Ontario, Calif.

25—*Fresno, Calif.:* Fresno Gas Model Record Trials for FFG. Jim Scheidt, C.D., 2225 Brown, Fresno, Calif.

25—*Taft, Calif.:* Taft Model Airplane Club Record Trials for FFG. H. E. Owen, C.D., 417⅞ Van Buren St., Taft, Calif.

DECEMBER

2—*Phoenix, Ariz.:* Class AA 3rd Model Rodeo for FFG, CLS, CLC, RC and Combined OR-TLG. Quentin T. Webster, C.D., 521 E. Camelback, Phoenix, Ariz.

9—*Arcadia, Calif.:* Class AA Team Racing Contest. Les McBrayer, C.D., 101-B Elm St., Alhambra, Calif.

9—*Bakersfield, Calif.:* Nordic Towline and Wakefield Rubber Record Trials. Mathew J. Puskarich, C.D., 1917 Esther Dr., Bakersfield, Calif.

16—*Tulare, Calif.:* Tulare Sky Kings Record Trials for all free flight classes. Don Peacock, C.D., 912 Apricot St., Tulare, Calif.

28-31—*Miami, Fla.:* Class AAA 3rd King Orange Internationals for FFG, CLC, OHLG, TLG, OR, CLS, CL, CLFS, RC and rat racing. Charles R. Quick, C.D., 1896 N. W. 36th St., Miami, Fla.

30—*Fresno, Calif.:* Fresno Gas Model Record Trials for FFG. Jim Scheidt, C.D., 2225 Brown, Fresno, Calif.

27th Year of Publication

MODEL AIRPLANE NEWS

JAY P. CLEVELAND, President and Publisher

December, 1956 Vol. LV—No. 6

CONTENTS

WILLIAM WINTER, Editor
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Contributing Editors: Peter Chinn (England), Don Grout, Ed Lorenz, Ted Martin, Bruce Wennerstrom, Harry Williamson

Executive and Editorial Office: 551 Fifth Avenue, New York 17, N. Y.

Advertising Manager, N. E. Slane, 551 5th Ave., New York 17; West Coast Adv. Mgr., Justin Hannon, 4710 Crenshaw Blvd., Los Angeles 43, Calif.

Published Monthly by Air Age, Inc. Editorial and Business Offices: 551 Fifth Ave., New York 17, N.Y. Jay P. Cleveland, President and Treasurer; Y. P. Johnson, Vice Pres.; G. E. DeFrancesco, Sec. Entered as Second Class Matter at the Post Office at Columbia, Missouri.

Price 35c per copy in U. S. Subscription Prices—U. S. and possessions: 1 yr. $3.50; 2 yrs. $5.50; 3 yrs. $7.50; Canada: 1 yr. $4.00; All other countries: 1 yr. $5.00. Payment from all countries except Canada must be in U. S. funds. Change of Address—Send to MODEL AIRPLANE NEWS, Subscription Department, 551 Fifth Avenue, New York 17, New York, at least one month before the date of the issue with which it is to take effect. Send old address with the new, enclosing if possible your address label or copy. The Post Office will not forward copies unless you provide extra postage. Duplicate issues cannot be sent.

by William Winter

► Sweden's L. Petersson took first place in the Wakefield finals at Hoeganaes, Sweden, August 17-20. Hard on his heels, only five seconds behind, came Herb Kothe, of Omaha, Neb. Russia piled up a fifth, eighth, ninth, and 36th, to place second to Sweden on a team basis, with the U. S. fourth, after Great Britain. America didn't win but, proxy fliers or not, put up a performance that needs no apology. High wind and rain accounted for the relatively low total times of 879 seconds for Petersson, 874 for Kothe, 871 for Britain's J. O'Donnell, who was tied for third with Denmark's E. Knudser; and 850 for E. Smirnov, Russia. Despite the rotten weather, Petersson, Kothe, and J. O'Donnell, put up four max's out of five flights. Russian ships, by the way, were made of reed and condenser paper —or so claims the release. If that's true, the Ruskies must be wizards, We'll take a rain check.

It was noteworthy that the models of Kothe and Montplaisir, taking second and 15th, were proxy flown by Swedish builders. Jerry Kolb, and Gil Coughlin, taking 13th and 31st, flew their own.

P.S. Russian and American entrants exchanged table marker flags.

• • •

► Also through AMA headquarters, the U. S. rules changes reported by Claude "Mac" McCullough, to be effective January 1. The highlights: Maximum time for free flight gas, outdoor rubber, and glider classes, is now five minutes; there's a new class for Jetex; FAI gas has equal status with Wakefield and Nordic under AMA regulations and VTO's on land only, ok. In free flight scale the power loading requirement is gone. A point system favoring low wings, biplanes, etc., as compared with Cubs, probably will be set up. (Why penalize a Cub for being good, or a guy for building one?)

Limited Class tow-line is replaced by Nordic A-1 (279 sq. in., combined wing and stab, at 5.08 minimum weight) but don't confuse this with Nordic A-2, which is what you are used to. No minimum weight in outdoor rubber. Rat racing, or so called simplified team racing, is an established class. In RC it is now rudder-only, single-channel (the Mickey Mouse class), and multi-channel. There will be an RC pylon racing event. In team racing, it's engines of .140 to .300; no more restrictions on engine size in Navy Carrier, and (*Continued on page* 62)

NEXT MONTH'S COVER
McDONNELL DEMON

PLANE ON THE COVER

In the spring of 1917 the Albatros D.111 hit the western front, and the "Bloody April" losses among Allied aircraft resulted. On 175 to 200 hp, the trim "Vee Strutter" did 120 mph. Later in the same year, new Camels and SE-5's had turned the tide. Span about 30 ft.; two Spandau machine guns.

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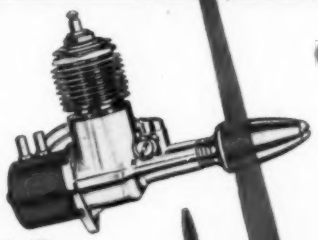

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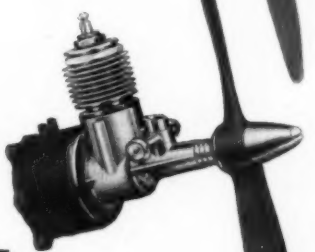
Here's the very latest in this popular series, ideal for both free and control line flight. Mounts flush on the face of the plane, features new lightweight, oversize fuel tank for extra range.



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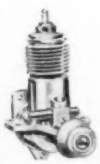

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"OK" CUB .099 **$6.95**

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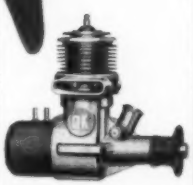
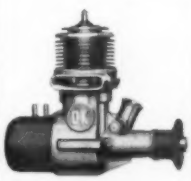


"OK" CUB .29 **$11.95**



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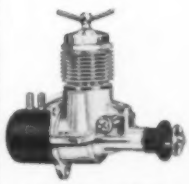

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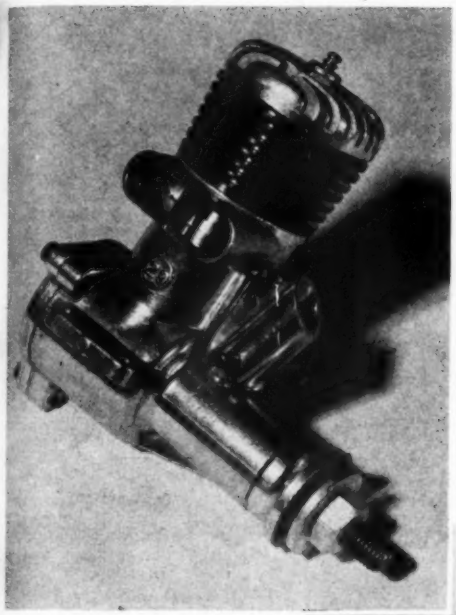
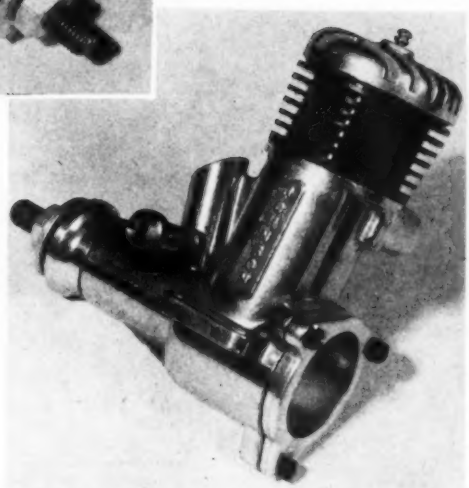


Engine Review

Johnson .29



Distinctive venturi and generous fins mark the Johnson—design descended from the well-known Orwick.

By E. C. MARTIN

And now we have still another good .29—already proved in radio control, stunt, and free flight. Here's the pitch.

► It is rather a rare experience to receive a charming letter from an engine manufacturer almost entirely taken up with derogatory criticism of his own product. The letter concludes with an impressive list of successes with the engine, and the assurance that any untoward wear or failure in the hands of users will be met cheerfully under their one year guarantee.

There is no such thing as an engine that you cannot blow up if you really want to, and in every engine there is one component which gives up the struggle first. If you beef up that part another one goes, and it is an everlasting spiral that eventually makes everything so heavy that the engine has no power anyway. Somewhere the designer has to draw a line and say "that is reasonable, and everyone who expects more is unreasonable." Aircraft used to be stressed to withstand loads of ten times their own weight, yet in a cumulonimbus cloud, with its hurricane updrafts, such aircraft could have their wings torn off. The designers and authorities governing safety specifications naturally do not expect sane people to go joyriding through thunderheads, and so it is with model engines. Having given the Johnson engine a good hammering and compared its dimensions with those of other comparable engines, one can only conclude that he is troubled with thunderheads just as much as any other manufacturer, but certainly no more. The Johnson .29 follows a well proven formula with the addition of several very interesting structural features.

The particular engine tested was not the very latest version, and several refinements have recently been added with a gain of about 700 peak RPM. The changes cover all the points which might be considered as out of date in the early engine and consist of a rectangular crankshaft port instead of circular, six cylinder head hold-down bolts instead of two, long-reach plug instead of short, and a fully hemis-

(*Continued on page 42*)

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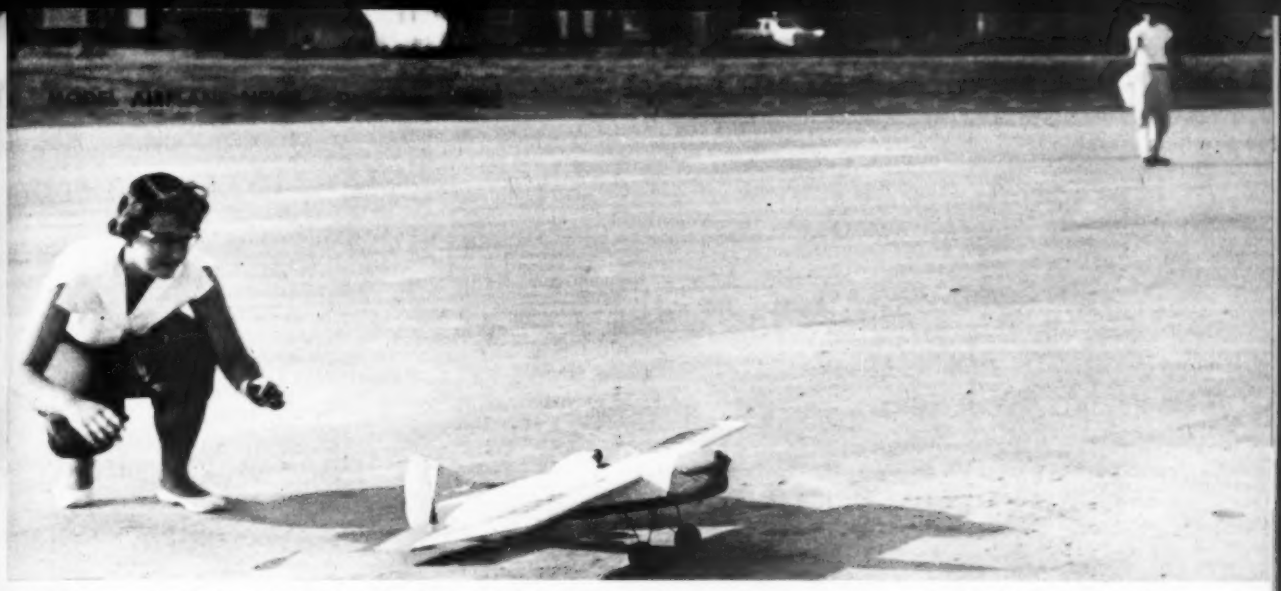


Gold Brick—one of author's originals—takes off. Helper is Shirley Austin, '54 Nats combat winner. Now in college, still flies speed, combat!

How to Test a Stunt Ship

The designer of the Half Fast takes you through the step-by-step procedure for wringing out new crates.

By W. F. NETZEBAND, JR.

► Are you itchy to fly a hot stunt ship? Are your square loops round and your round loops square? Does checking out a brand new airplane give you butterflies or a bushel basket of pieces? Then read on, because in this and articles to come, we have a lot to say on how to check out a new ship, how to fly a 394 point stunt pattern and how to design your dream job sensibly, scientifically and right.

First flights are fraught with nerves and unanswered questions. Let us approach the problem logically and set up some rules for pre-flight inspection to remove some of the first flight buts. Since design problems will be covered later, we'll assume a kit model or a debugged design is to be checked out.

Preflight inspection should include: 1—Balance; 2—Control freedom; 3—Wheel tracking and freedom; 4—Warps; 5—Engine and accessories; 6—General airworthiness.

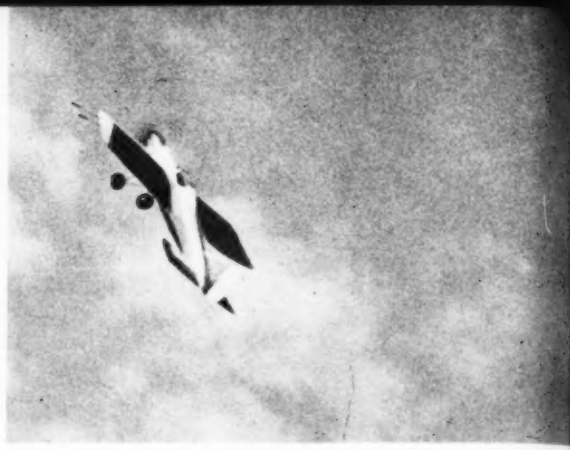
Balance should be according to the designer's recommendations. Conventional ships should balance forward of a point one-quarter of the distance from the leading edge to the trailing edge. An example would be: for a wing ten inches wide, balance should be less than 2½ inches from the leading edge. Notice we said nothing about the leadouts. They don't affect the balance point as such. Suspend the model by wing tips, indoors out of the wind, and see where it remains level in flight position. If your arms are too short, get a helper. If ship balances aft of quarter chord, add weight to nose until balance moves forward of same. If it is way up forward don't worry about it. You're safe.

Landing gear position is important for good take-offs and landings. Simple-lined, attractive.

Controls should be free of drag and rough spots in travel. At times during flight you will have less than one pound of tug and will need free controls. (Monoline users; be sure your elevator pops back to neutral when torque is released.) Controls should be free enough that the elevator will droop from its own weight. Use a fairlead or bushing every 6 inches on your pushrod to prevent buckling and loss of control.

When fixing your wheels on their axles, use nylon or ordinary wheel collars or solder a washer on the end. Avoid use of acid core solder to prevent corrosion which results in wheel freezing. Use a good soldering paste, a hot iron and wash joint thoroughly after hardening, with lacquer thinner. Oil immediately and periodically. A surprising number of flights are botched from stuck wheels. Roll the airplane forward gently on a smooth surface. It should move straight ahead, whether tricycle or conventional. If not, bend tail skid or nose wheel until it does. Same goes for speed dollies. Panted

In these four pictures, left to right, the four positions in loop.



The climb. Wing warps and incorrect wing weight have bad effects.

wheels should be checked carefully for sticking. Remember you have to take off before you can fly.

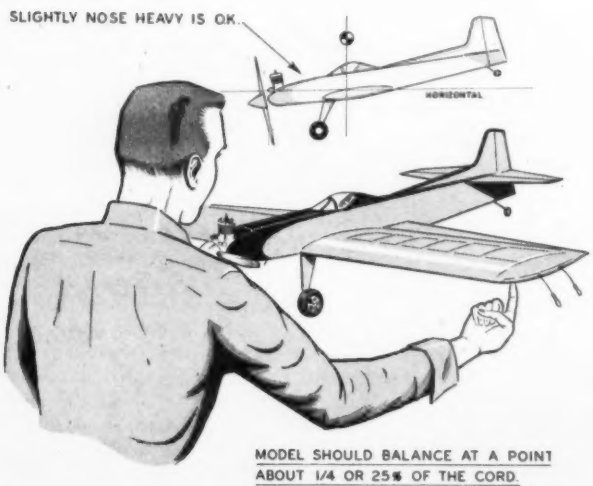
A warp in a wing results from uneven shrinkage of covering or poor alinement during construction. Warps are dangerous, but can be cured. They will cause one panel to have a different angle of attack from the other, resulting in different amounts of lift and a banked altitude in flight. For instance: Outboard panel warped down at the rear; model will bank into the circle causing a decrease in line tension and during a tight maneuver possibly complete loss of control. On a stunt ship any warp is bad since it will get you upright or inverted. An illustration shows how to view airplane to look for warps. Line your nose up on center line of the fuselage and keep both eyes open. If no warps are present the trailing edge will split the upper and lower contour of the wing. Warps may be corrected rather simply. To soften the covering and structure, steam affected panel thoroughly using a vaporizer or tea kettle on both sides until covering becomes slightly loose to touch. Sit down somewhere and warp surface in opposite direction and hold for at least 15 minutes. When released it will spring back a little, so go past the place you want it to end up. Let it set up overnight so that all will be shipshape before flying.

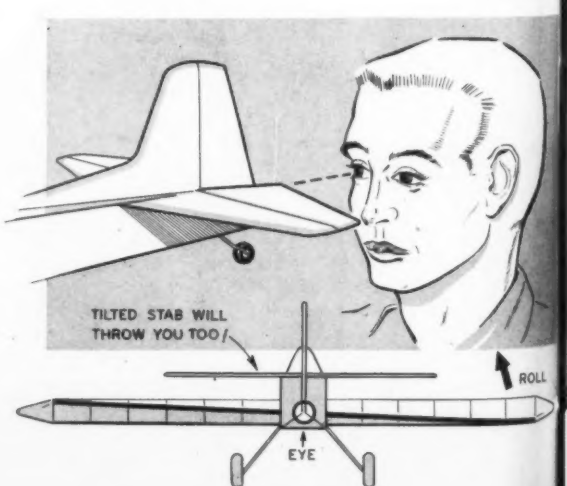
Run your engine at home, during the day, to check out tank fittings and location. Try her inverted too. No need to fling the plane around madly during this check since you prove nothing. A final check for loose joints, etc., will finish up your preflight check. Don't forget to take a rag with you to the field. Always clean model after flying.

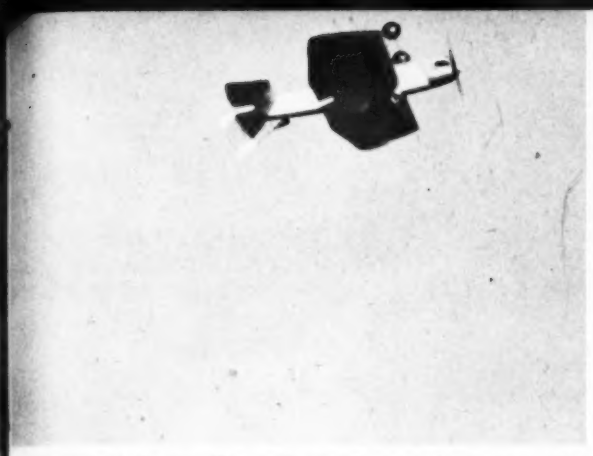
Before flight, lay out your lines and make sure that neutral elevator corresponds to your neutral at the handle. The author washed out a good ship for not checking this, so it can happen. Pull test lines to check fittings and lines. First take off is best accomplished downwind to give you a half lap to catch up if anything goes wrong. No matter how carefully designed and built, a model airplane must still prove itself in flight. Here are some characteristics to look for on the first flight.

Assume the model is trimmed too nose heavy. The take off will be slow and will require an excessive amount of up elevator to break free. Maneuvers may be small enough but you'll have to ride the controls hard to do them. Level flight will be beautiful and level. Normally you'll have lots of tug in this condition, but this is not a criterion. The plane will resist all attempts to make it turn quickly. The landing will be rather hot and abrupt as the engine quits. All in all, this is the best condition for a first flight, since the ship will be completely stable and you'll have the best chance of making a second flight the same day.

If your ship should be tail heavy, beware! You are in for a real thrill. Take off will probably be instantaneous and plane will undoubtedly climb right up to the top. Controls will be quite sensitive. When you try to bring her down to low altitudes she'll try to tuck the nose under and up control will cause bucking. If you get hold of one of these monsters, let her find her own altitude. If only mildly tail heavy she may fly alright, but condition will







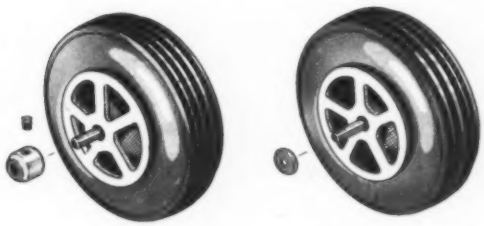
Inverted at the top. Flap angle reveals reversed controls applied.

Dive at end of the maneuver. Kits not hard to test. Dream Ships!?

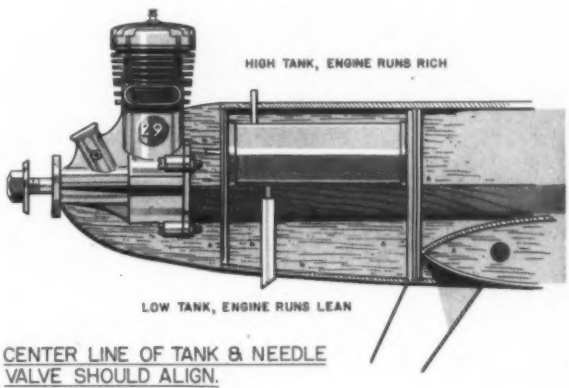
show up in extreme reactions to minor changes of controls and loops will tend to tighten up. A loop with a tail-heavy ship will generally end at a much higher altitude than it started. Tug will probably be light. Your feeling will be that the plane is flying you. This condition should be corrected with lead in the nose before trying that second flight.

You removed the visible warps before flight, didn't you? But let's say your ship was shy on tug inverted. Your sharp eyed helper observed that the plane was flying with the outboard wing lower than the inboard in upright level flight, but when inverted the opposite was true. The outboard trailing edge is warped up or perhaps the inboard trailing edge is down. Not so good. This can get you in trouble during a maneuver when the wing is really working hard. Slight warps may be controlled by tabs, either soft aluminum or a triangular cut piece of balsa. Place tab on outboard panel since it's more effective there, and bend opposite to warp. Experiment until wings ride level in both upright and inverted flight. If flaps are used, slight warps may be corrected by bending flaps opposite to warp.

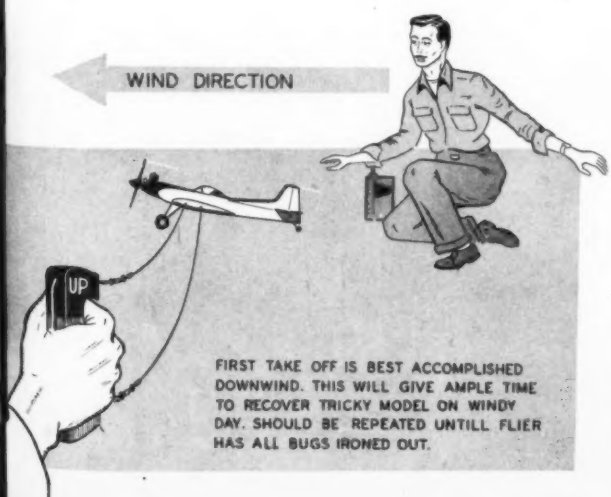
The matter of wing tip weight comes up immediately. Why the weight? The control line model must support not only itself but the lines. Lateral position of the center of gravity of model must be displaced toward the outside of the circle an amount sufficient to cause equilibrium to occur during a tight pullout. Huh? Flight characteristics will look like this. Insufficient (*Continued on page* 46)

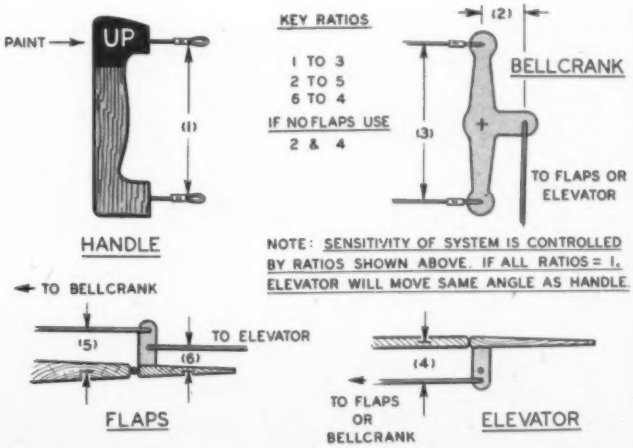


USE NYLON OR METAL WHEEL COLLARS. SOLDERED WASHER ON AXLE IS COMMON PRACTICE. DO NOT USE FLUX OR ACID CORE. THEY TEND TO BIND AND WILL MAKE TAKE-OFF DIFFICULT.



CENTER LINE OF TANK & NEEDLE VALVE SHOULD ALIGN.





FOR AIRPLANES ONLY

These out-of-the-world pictures of latest of our military aircraft will enthuse scale fans. But so many readers ask for pix, that most apparently just want to look.

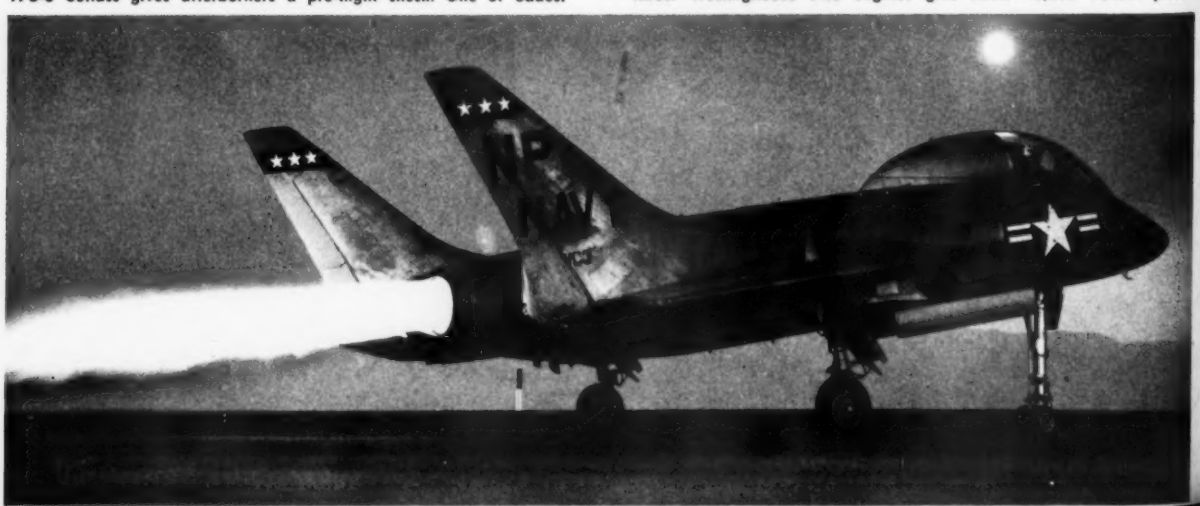
Like paper darts, Convair F-102A supersonic interceptors for the Air Force, fly in formation.

An all-weather fighter, this delta is 68 feet long, spans but 38. Has P & W J57 jet engine.

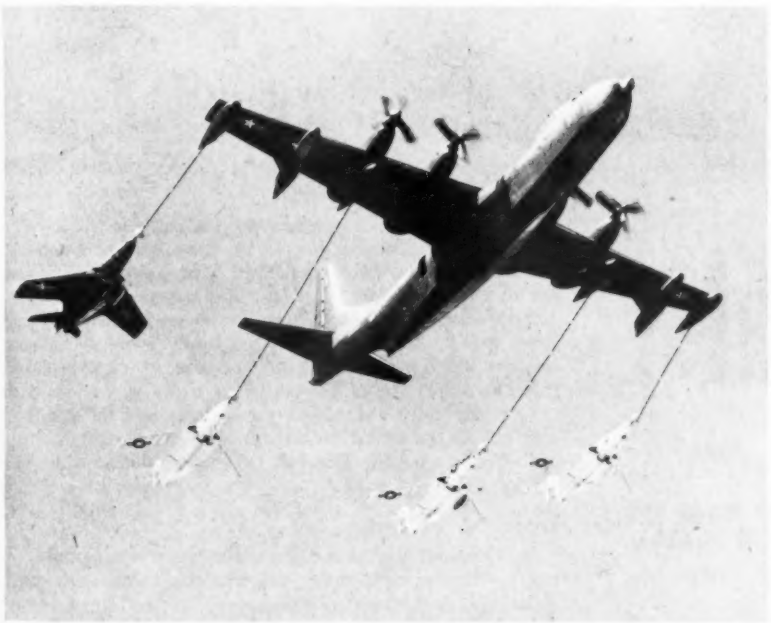
F8U-1 Crusader is Vought-built fighter for Navy. Capable of 1,000 mph plus, has two-position wing, shown "up" for take-off, landing.

McDonnell F3H-2M Demon bristles with Sperry Sparrow air-to-air missiles. Fastest Navy all-weather fighter, also packs 20-mm cannon.

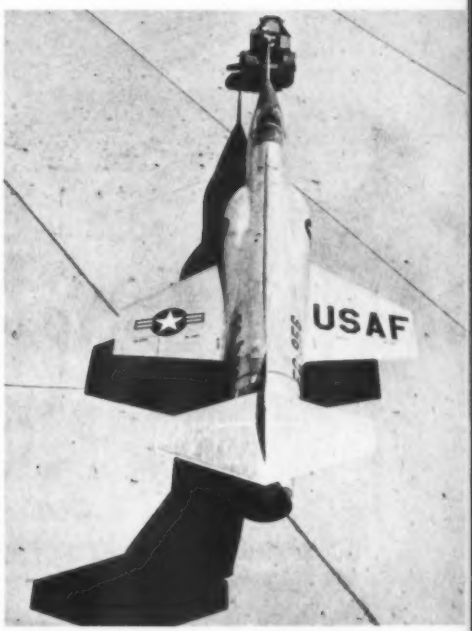
Spewing 1,200 degree flames from its twin tail-pipes, Navy Vought F7U-3 Cutlass gives afterburners a pre-flight check. One of oddest fighters in service, Cutlass has no tail surfaces. Two 6,000 pound thrust Westinghouse J-46 engines give climb 13,000 ft/min plus.



Carrying its own flying saucer, really a radome for the largest airborne radar so far, is Navy Lockheed WV-2. For "early warning."

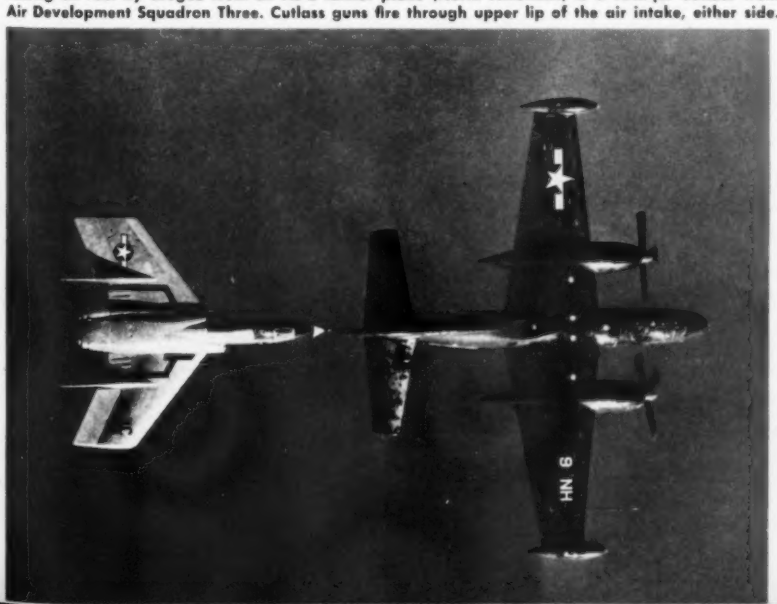


Convair's Navy R3Y-2 Tradewind refuels four Grumman Cougars at time. The turbo-propped 80-ton Tradewind carries fuel for eight fighters. Allison engines, 5,500 hp ea. Span is 154 feet nine inches.



World's fastest combat plane, Lockheed F-104A Starfighter, GE J-79 jet, has knife sharp wing.

Taking on fuel by drogue from an AJ-2 tanker plane (North American) is a twin-jet Cutlass from Air Development Squadron Three. Cutlass guns fire through upper lip of the air intake, either side.



Two J-57 10,000 pound thrust jets push Voodoo by McDonnell. AF F-101A photo reconnaisance.

Three versions built: windy weather, combat, stunt. The author here is cranking up the windy weather version. Prone pilot is in cockpit.

the Aero Bat

By ALLYN M. ALDRICH

For .25's to .35's, a well-tried stunt job that performs a flashy pattern. It is ultra-simple and lightly built, a bit different.

All our stunt authors this month have pretty helpers! This time it is Miss Carol Lee who poses the black Aero Bat for the camera.

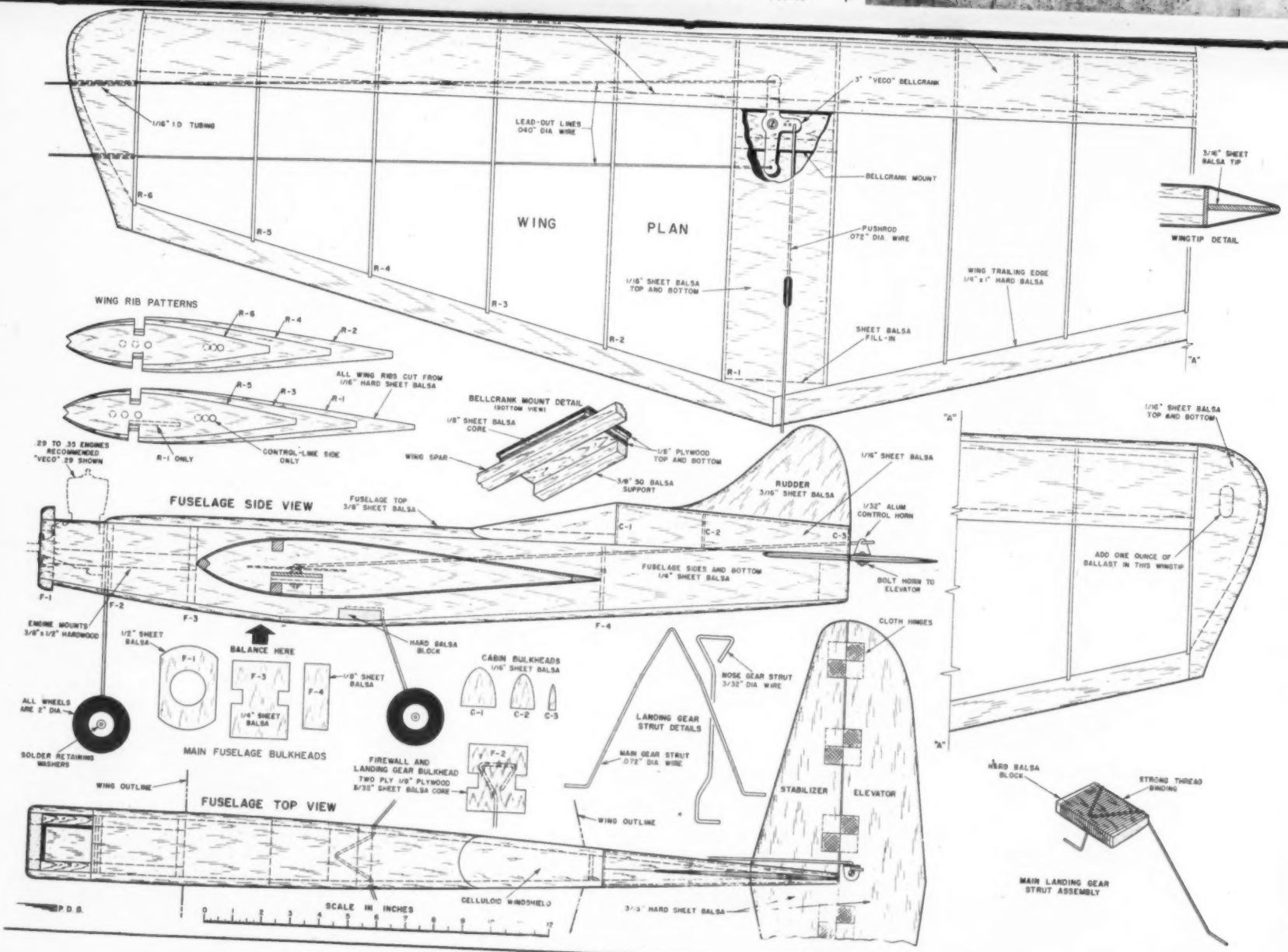
► The Aero Bat is a class C stunter, designed and built for top performance. It has all the properties of a contest winner and then some. The large wing gives it plenty of lift to go through the tightest maneuver and yet the airfoil is such that it doesn't slow down in maneuvers to any great extent. The moments of the fuselage are such as to provide stability in level flight and enough of a lever to turn the ship tightly. The stabilizer and elevator are just big enough to provide plenty of surface area for stunting and yet do not cause enough drag to cut the speed any appreciable amount. The Fox .35 engine (other .35's are OK) is powerful enough to give a slightly greater speed than is necessary, to stunt the craft, for getting out of trouble. A .25 will pull the ship through maneuvers.

The landing gear was changed from a conventional to a tricycle for better landings and take-offs and is so placed as to provide the smallest amount of drag and have ample spread for balance.

I have buit three versions of this craft; a combat, a calm weather stunter, and a windy weather stunter. The combat ship has a very small wing compared with the two stunters, and sacrifices looks on this account. The cut-down wing results in a gain of speed and no loss of maneuverability. The landing gear is optional on the combat ship but it cuts down the speed, so should be left off. The calm-weather stunter has largest wing of the three, but will not keep tight in too strong a wind. The windy-weather stunter has a slightly smaller wing and will hold the lines in a fairly strong wind.

The small number of wing ribs may tend to give the idea that the wing is weak and will not stand up to crashes and rough landings. The main spar provides most of the strength in the wing and takes up almost all of the shock while its greater weight is far less than the weight saved by cutting down on the number of ribs. When I built the Aero Bat I used the following procedure.

The main span should be cemented and set to dry completely before putting on the wing ribs. While the spar is drying, the ribs and fuselage sides can be cut and the motor mounts cemented so that they will have plenty of time to dry. The wing ribs, control system, and wing spars are put on next and given ample time to dry before the planking is put on. Slide the fuselage sides on and cement the bulkheads X and Y to fuse- (*Continued on page* 58)



FULL SIZE PLANS AVAILABLE. SEE PAGE 52.

Going up! Solo flying in the wind requires a sure launch since time passes before transmitter is reached. Hand-held types good here!

Coming down, close by, and on its wheels. Shooting good landings is mostly a matter of following the same pattern on every flight.

what goes UP..

MUST COME DOWN . . . where and how up to you. Nearby landings on every flight requires faithful checking at home and on field. Pertains to single-channel, rudder.

► Progress in radio control has been rapid over the past two years. Multi-channel, transistorized light-weight equipment, dual proportional control, and now eight-channel simultaneous. But the beginner and the sport flier is in a mess. More and more people want to fly radio—but how do they go about it?

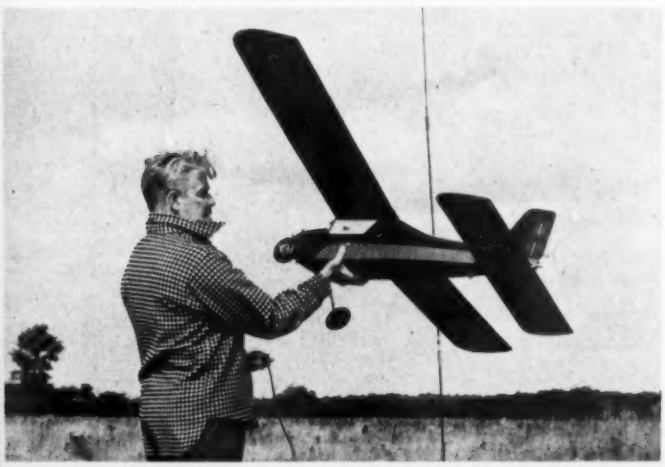
The writer has encountered recently a flier with an ¼ inch steel wire antenna (heaviest landing gear wire), another who had no spring in his relay, another who did not know what a ground check was, still another who didn't know why he needed a meter, and so on.

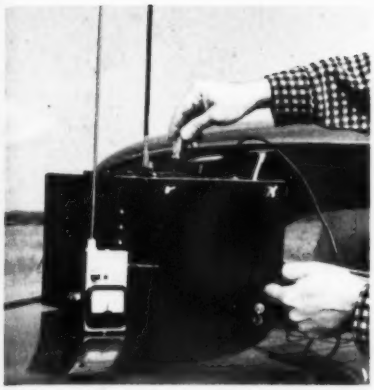
It isn't sufficient to buy a transmitter, receiver and an actuator and expect to fly radio reliably. There are things you have to know—although you don't need to understand electronics. There are other things you have to do—to fly week after week without mishap or flyaway. To get across the idea, model photographer John Schneider collaborated with the author in this start-to-finish real action series; the flight, incidentally, was made in a 20 mph wind with gusts.

It is inevitable, of course, that only one brand of equipment, radio, escapement, fuel, engine, propeller, can be used at one time. It is true, as deBolt always claimed, that a suitable combination of everything, from glow plug to relay, be used. The plane and everything in it must go together. One combination is shown here. Actually, there are hundreds of combinations. There are other fuels, engines, radios, escapements, servos, etc. But here, for the first time, we shall discuss one typical combination. To repeat, this is not an endorsement of any particular product.

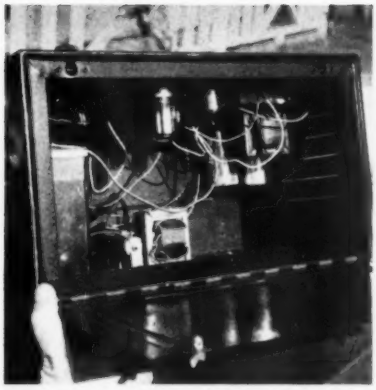
THE PLANE: The ship was not built from a plan, or a kit; there were no plans. However, it is a loose scale-up of a Rebel. Desired was a ship that could make many long full-tank flights, fly in any wind, have no engine troubles, and carry (for the writer) a doubled set of batteries for economy and minimum maintenance. Having committed many bobos in the past in making installations, this ship has plenty of room and everything is really accessible.

Before launching, motor running, see that controls obey all signals properly. Even if only one miss, don't fly. You always lose.

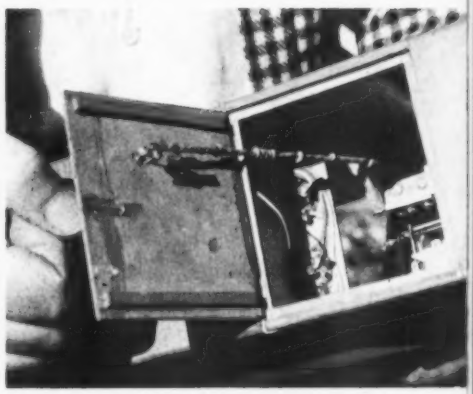




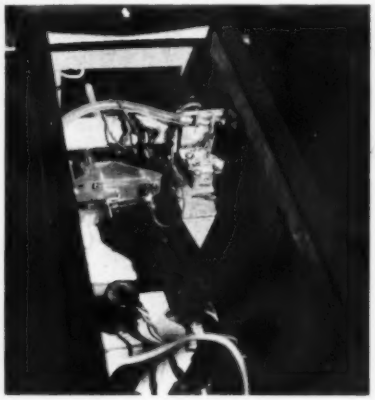
Field strength meter is only assurance that X-mitter puts out—is a help for tuning it.



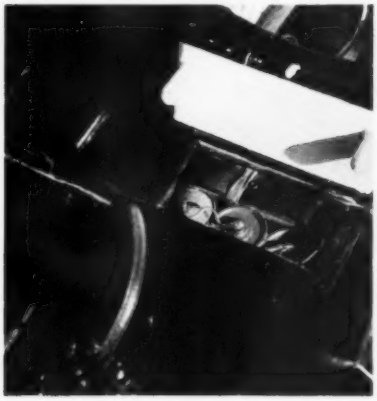
X-mitters vary, natch. This one has: a wet cell, left; charger, X-mitter, power pack.



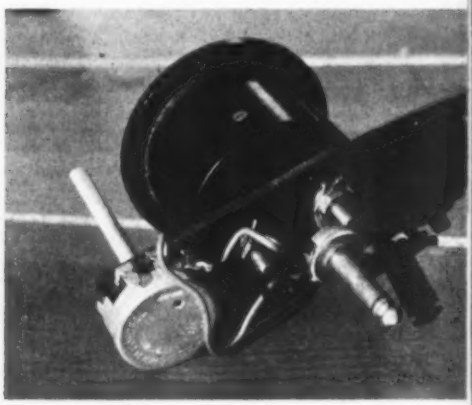
Motor escapement rubber snaps shut the access door. Socket joints easily inspected.



Babcock MK 2, rear, left; adjacent, Bonner SN motor control. Note bat and radio plugs.



Battery hatch cover in truck keeps out all exhaust, fuel. Veco .19 shown. Sport fuels.



A 50,000 ohm "pot" mounted on a good meter eliminates "pot" from plane, checks relay.

Span is about five feet. But it is just an ordinary model.

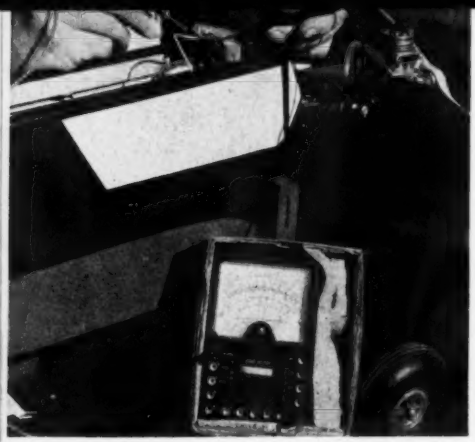
POWER: In RC, especially in our area, overheating engines are a plague in the summer time. The weight and drag of any RC ship load down a glow motor beyond what it was designed for. Most of today's motors are designed for competitive free flight, speed, etc., but not primarily for radio. The new Veco .19 was used for its ability to stand up under overheating. There is no reason why the Torp, Cameron, Fox, McCoy, etc., cannot be used. Despite a weight of five pounds, a good .19 will climb a plane like this out of sight overhead unless spun down, or throttled back, on a long flight. More power is not needed. Forget those 29's! A two-ounce deBolt tank gives a very long flight. Good flights can be made on a quarter tank—beginners note that.

FUEL AND PROPELLER: Various 11-4's and 10-5's were employed, with roughly the same performance, but with a better, lazier climb on the bigger diameter. Low-pitch props tend to pull down the nose after launch before wing lift takes over—this includes ships with designed-in downthrust (positive angle in both wing and tail) which is not apparent to the eye. Some climb can be killed off by using a prop with a lot of wood, such as the Top Flite. The lighter Power Props and Tornados rev faster and may help "unload" the engine on a hot day when it becomes difficult to lean the engine out without overheating.

Supersonic 100 fuel was used because it has somewhat less power and runs cooler than 1000 due to a lower nitro content. Testor's 39 is another sport fuel. If more performance is required, however, Fox, Powermist, Supersonic 1000, O & R, Ohlsson, and others will help. OK and Champion plugs were fitted. Some plugs are hotter than others, so the choice is a matter of conditions. A Spitfire plug, for example, will help starting in cold weather. But any hot plug and hot fuel combination in summer may cause preignition and overheated running. Overheating makes launching a misery and the resulting flight an aggravation.

THE RECEIVER: The receiver was a Citizenship 27. Its assembly on one side of the chassis permitted mounting on foam rubber (by Pliobond) and arrangement on a vertically sliding tray made of 1/16 inch plywood. Ninety nine flights had been made with this receiver at this writing without difficulty. Frankly, there are two schools of thought, one favoring hard-tube (vacuum tube) receivers and the other the Lorenz variations with two tubes (a gas tube for the detector). Either type has range beyond the flier's ability to control an airplane so range is not a point. The drawback of the gas tubers is the variations in the tubes themselves. The two-tubers are mainly popular because their good current change affords reliable relay operation due to greater contact pressure. However, the hard tuber always operates when you turn it on—provided the installation and tuning are proper, as is true of any radio. The Citizenship 27, with its comparatively small current change, does not allow a poor mechanical installation that readily transfers engine vibration, especially in a high-speed spiral where these things usually show up.

This receiver has two trimmers to tune. One adjusts the



Check voltages under 15-second sustained load before every flying session. Any good meter.

Sometimes you have to adjust a relay so it is imperative to find out how. Some relays tough.

Dollar bill right thickness to slide between a contact and armature on particular r'cvr shown.

Don't forget escapement rubber. Replace every week in summer. Operate escapement motor off.

Pliobond r'cvr to foam on sliding panel against bulkhead for safety. Tapered dowel here tunes.

Ground checks pay-off. Arm held up means hold signal. Up, down, for on and off. Safety first!

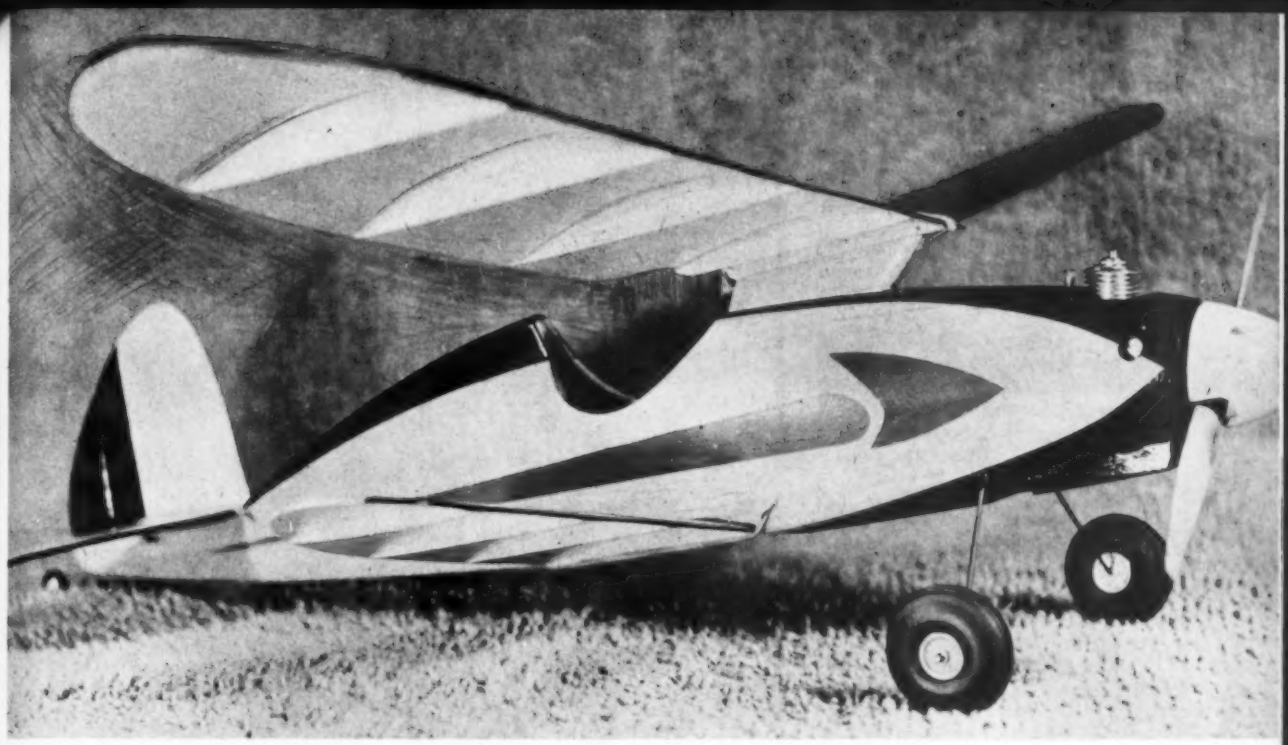
sensitivity and the other the frequency. As per directions the sensitivity trimmer was screwed in before every flying session until the idling current dropped, then was screwed out again until normal idling was resumed, after which the trimmer turned at least another 90 degrees out. Some people say 180 degrees. At 90 degrees the sensitivity and range was great and no unwanted control movements occurred in the air due to tuning—an overly sensitive adjustment on a hard tuber and the airplane may seek to fly itself! The second trimmer was then used on normal ground checking for distance.

THE METER: It is essential that a good meter be used on any of these carrier wave radios, as distinguished from tone (Babcock, etc.) which may be tuned by ear phones. The meter in the pictures is a Weston 0 to 3 mil meter. It is mounted directly onto the phone plug which slides into the meter jack built into the airplane. The potentiometer ("pot") shown mounted with the meter is used for checking the relay pull-in and drop-out. It is 50,000 ohms. Turned to the left, it reduces the idling current until the relap drops out to operate the escapement. Turned to the right, it brings the current up to normal, the relay pulls in and releases the escapement. Careful readings should be taken of both these points and the relay adjusted if the values ever change more than a half-tenth mil of their own accord. You must know how to adjust a relay to fly radio satisfactorily for any length of time. The author does not trust jacks and uses a shorted plug when flying.

THE RELAY: The receiver came equipped with a Sigma 4F. On any receiver with a low idling current and small current change, it is desirable to have a good sensitive relay. A beginner also needs adjustable screw contacts and sturdy construction as on the 4F. Too many people try to use relays intended for multi- or for two-tubers where big current changes and high contact pressure is available. For this and similar receivers the Sigma 4F and, especially, the 26F, is ideal. The 26F is the only relay in our field designed for operation at less than a mil pull-in and drop-out. (However, the 26F has no screw adjustment, but probably never requires any.) The new Kurman is another relay with screw contacts. We had no opportunity to check the Babcock relay.

It is highly desirable to suppress the spark that occurs between the relay armature and the contact when the escapement circuit is broken. This is especially true of low current change and low idle operation because pitting and sticking of the contacts, or dirty contacts, will surely result sooner or later. Naturally, the contacts can be kept clean. Some people use carbon tetrachloride (dangerous to breathe), others any soft material, such as facial tissue. The spark can be held down by connecting a .02 disc ceramic condenser and a 100 ohm resistor in series between the contact and the frame of the relay. Do not use less than a 450 volt condenser of half watt resistor.

On 67½ Volts of B current, this particular receiver idled at 1.6 to 1.7 mils. The relay was adjusted to drop out at .9 mil and to pull in at 1.3. This left a margin of at least .4 to maximum drop on signal from transmitter, and .3 to .4 at the upper end to the normal idle. Various experts recommend .1 separation between drop-out and pull-in. They are crazy. Close adjustments invite vibration, skipping, chattering, and crashes or bad control. Incidentally, a dollar bill just fits between the armature and the contact at this adjustment. The relay (*Continued on page* 40)



No tissue to tear! If you do fumble, both wings knock-off readily. Doesn't require a prairie flying field—none of those 50 mile treks!

SNOOPY

By TED STRADER

If you fly for fun, you need contest free flights like a hole in the head. Try this rugged, sensible .049 sport.

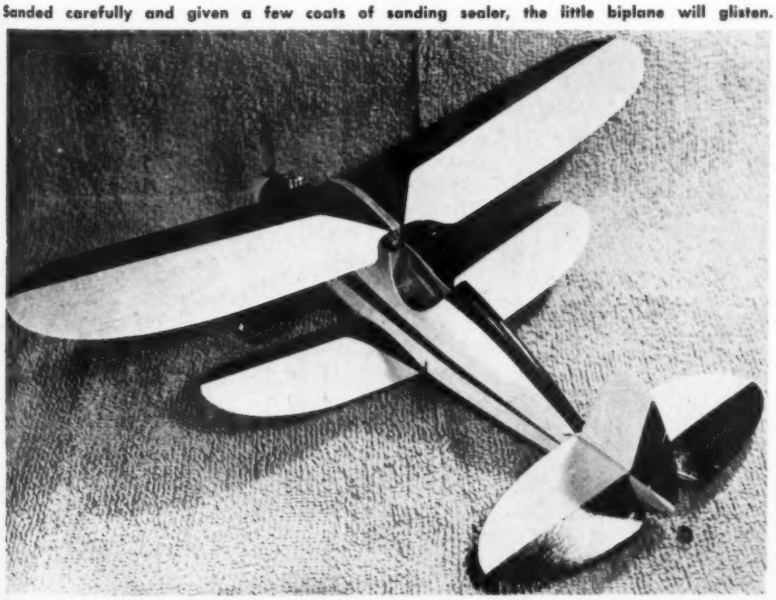
► This model is dedicated to the proposition that a lot of modelers like to fly just for the fun of it with a plane that generally appears like a life-size ship.

On the other hand, our tests with the Atwood Signature .049 up front indicate "Snoopy" could cause quite a bit of consternation in contest circles.

Tests to date have been made with two engines. For primary tests, and weak hearts, our .035 Torpedo worked nicely. For the supreme test we re-installed the Signature at 9 degrees down thrust and 3 degrees right, tried to slow it down a little and closed our eyes. Better we should have forgotten to put on the propeller. "Snoopy" took off in left circles and made like a bird. In about 20 seconds it was a speck. The transition from power to glide was smooth and the model then proceeded to climax a thrilling test hop with a beautiful, flat, left-hand, slow glide.

For those who would rather spend their flying time in a confined area and not on safari into unchartered corn fields, we would suggest an .049 of less wallop than the one we use. The contest boys can use their own judgment.

Sanded carefully and given a few coats of sanding sealer, the little biplane will glisten.



CONSTRUCTION: With very few exceptions, "Snoopy" is fashioned completely from 1/16" sheet balsa. There are only two places on the fuselage where the curvatures approach a multiple compound attitude. One is the top forward engine enclosure and the other is the part of the fuselage aft of the cockpit from the center line to the base of the headrest. The application of a little warm water, patience and rubber bands will deal with this problem in jig-time. Construction can be speeded up by cutting out all parts needed before building is actually begun.

FUSELAGE: Transfer the center line and all former and doubler locations directly onto the 1/16" sheet balsa side patterns to assure a more perfect alinement. Cement doublers and the 3/16" square landing gear base reinforcement in place. When dry, install firewall former 1 and former 3 in place, cement-

Continued with plans on next page

ing them up the fuselage sides only as far as they are straight. The doublers will help keep the framework alined. Check before the cement dries to be sure.

When dry, install former 2 in place, cemented in the manner of the first two formers. Next join the sides at the tail and when dry, install the remaining formers (4-5-6) in place. These, too, are cemented only up as far as they are straight, for the time being.

The next step is to form the top half of the fuselage. The full nose doublers 1 and 2 will necessitate the use of a little hot water applied with a cleansing tissue to the nose section. Do not cement the sides.

Wrap lightly with rubber bands until the sides assume the shape of the formers 1, 2 and 3. Allow to dry completely. When dry, remove rubber bands, cement, re-wrap with rubber bands and allow to dry.

The landing gear can now be bent of 1/16" steel wire, laced with thread to the 1/16" plywood landing gear base, and this unit cemented in place. Do not cement the landing gear to the plywood base yet. The thread will hold it in place sufficiently for the time being. Later, when the bottom forward 3/32" sheet is installed, it can be alined and cemented.

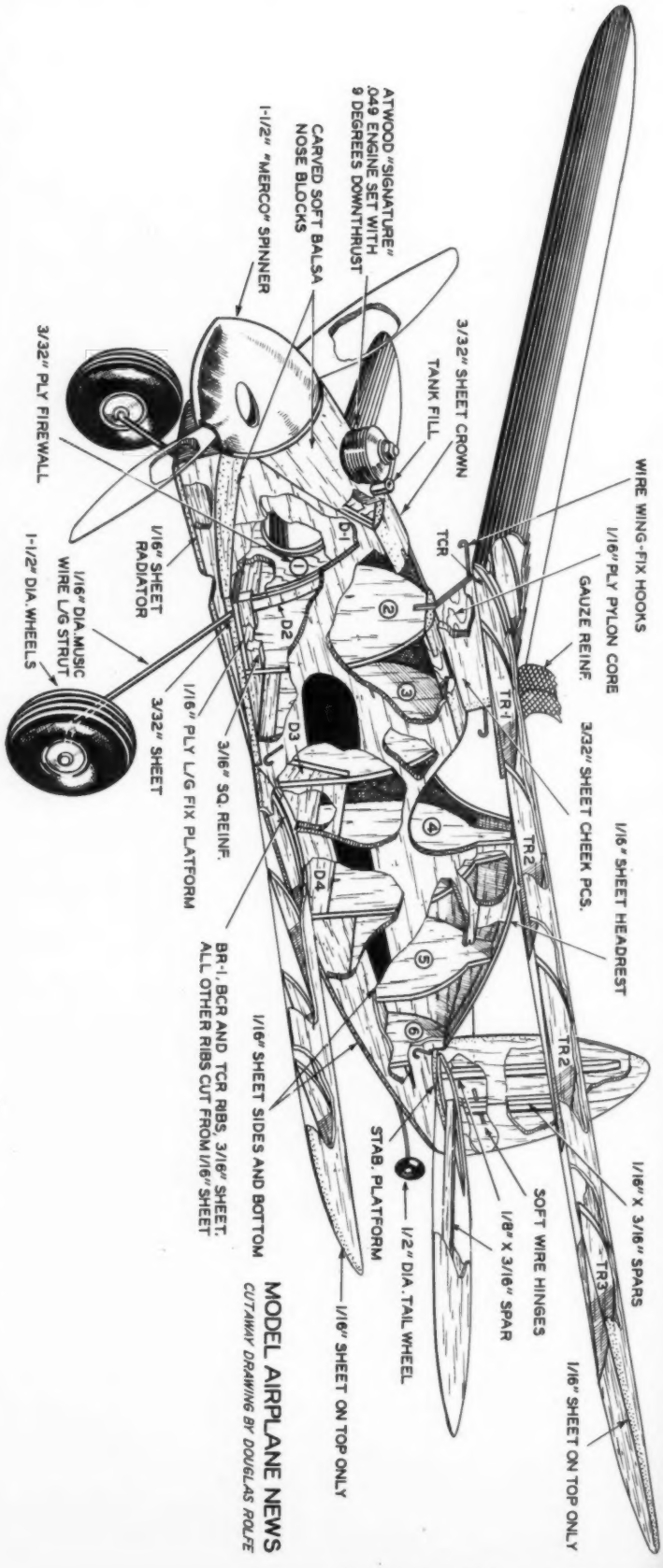
With the front half of the fuselage dry, we are ready to draw the aft top section into shape. Wrap a few rubber bands lightly around it and see if it will readily conform to shape. If so, cement bulkhead to sides. If a little difficulty is experienced, employ the same procedure used to form the front portion of the fuselage.

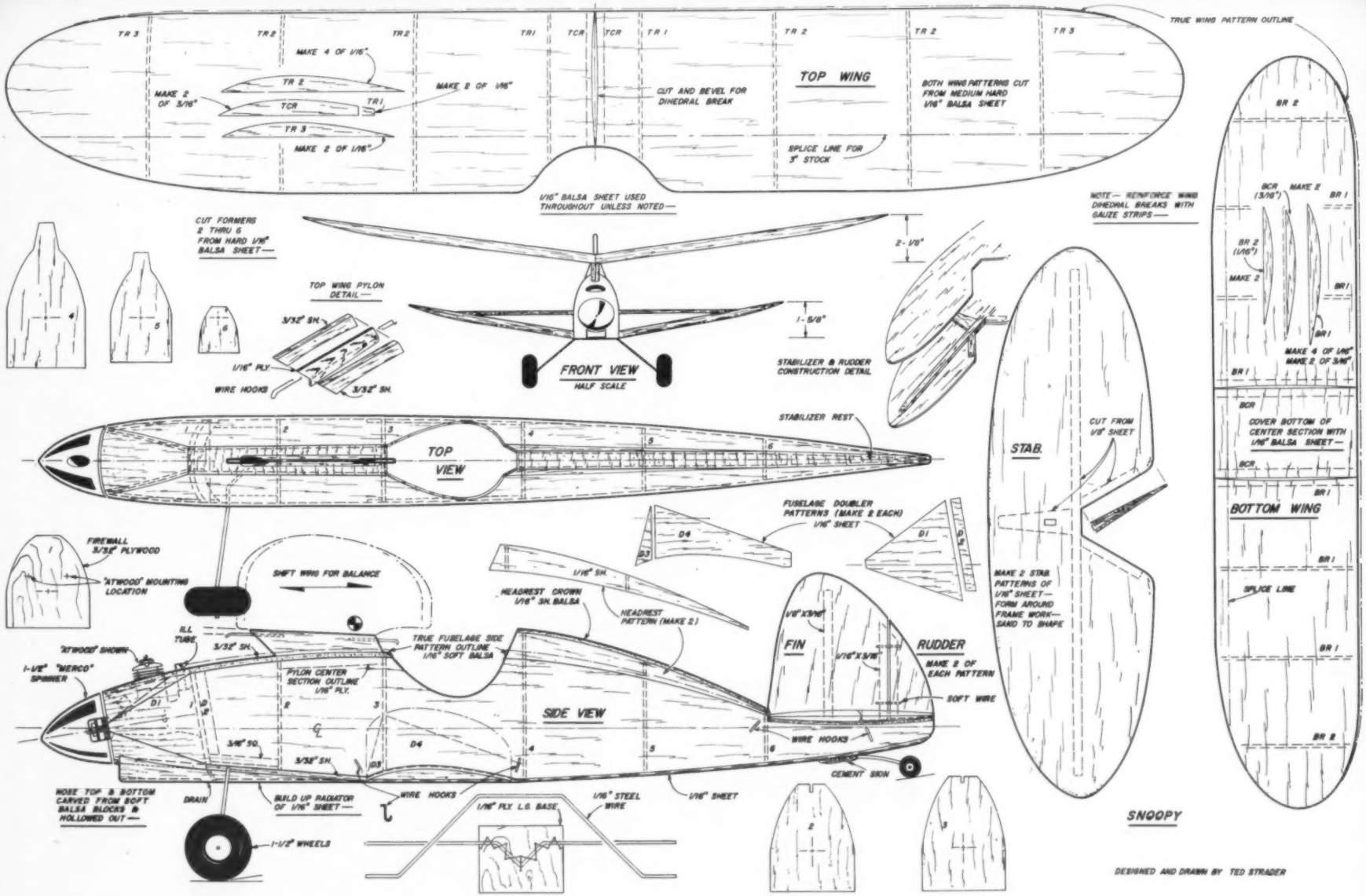
Next, cement the headrest pieces into place. Then sand the top and bottom of the entire fuselage to take the remaining sheeting, including the nose section.

The headrest crown, stabilizer rest, and aft bottom sheeting can be cut to rough outline and cemented in place. Here, again, rubber bands will give a much neater appearance than using pins.

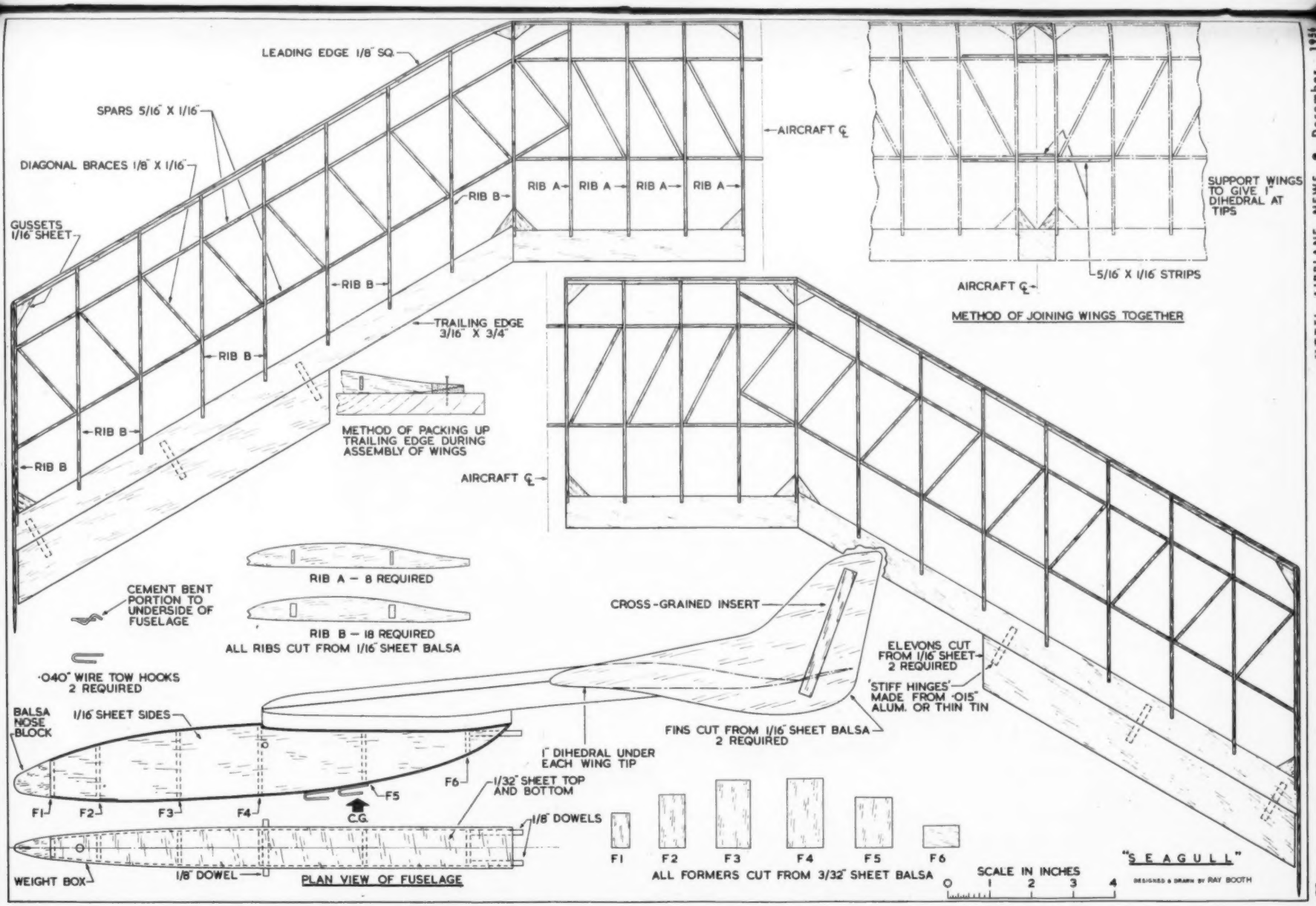
At this time the center section of the top wing pylon, which is cut from 1/16" plywood, is set into the slots in formers 2 and 3 and cemented in place. The outer 3/32" sheet pylon pieces are installed later. Carefully cut a 1/16" slot in the 3/32" forward top sheet and cement into place.

Now, line up the landing gear. Set the 3/32" bottom sheet into place and press against the landing gear to make an impression. Gouge out a slot to accommodate the landing gear, re-check the landing gear alinement and cement it and the forward bottom sheeting in place. Select two soft balsa blocks of the proper size for the nose and cement in place. A piece of square balsa strip, 1¼" long, can (*Continued on page 38*)





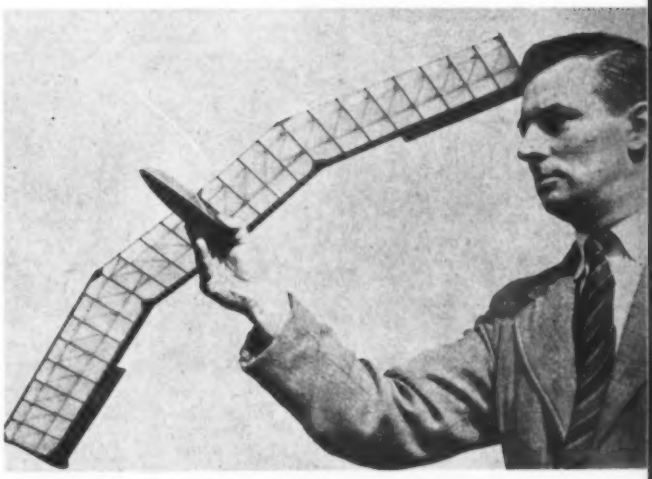
FULL SIZE PLANS AVAILABLE. SEE PAGE 52.



FULL SIZE PLANS AVAILABLE. SEE PAGE 52.

SEA GULL

By RAY BOOTH



How can it fly without a tail? Angled-back tips create some stabilizing action. A flying wing takes stable airfoil to "stay put."

Freak craft all too often are booby traps for the unwary. This tail-less towliner is a tried and true performer. A promise!

Different, but always practical, are the slightly off-beat flying machines dreamed up by the designer. See, it's easy, he says here.

► Construction of a tail-less model usually involves the builder in a rather complicated wing structure, since most tail-less designs call for "wash-out," that is, reduced wing incidence at the tips, to be built in during assembly or, alternatively, steamed to the appropriate 'twist' after covering and doping. The author feels, therefore, that a large number of young modelers will not attempt construction of a tail-less model for this reason.

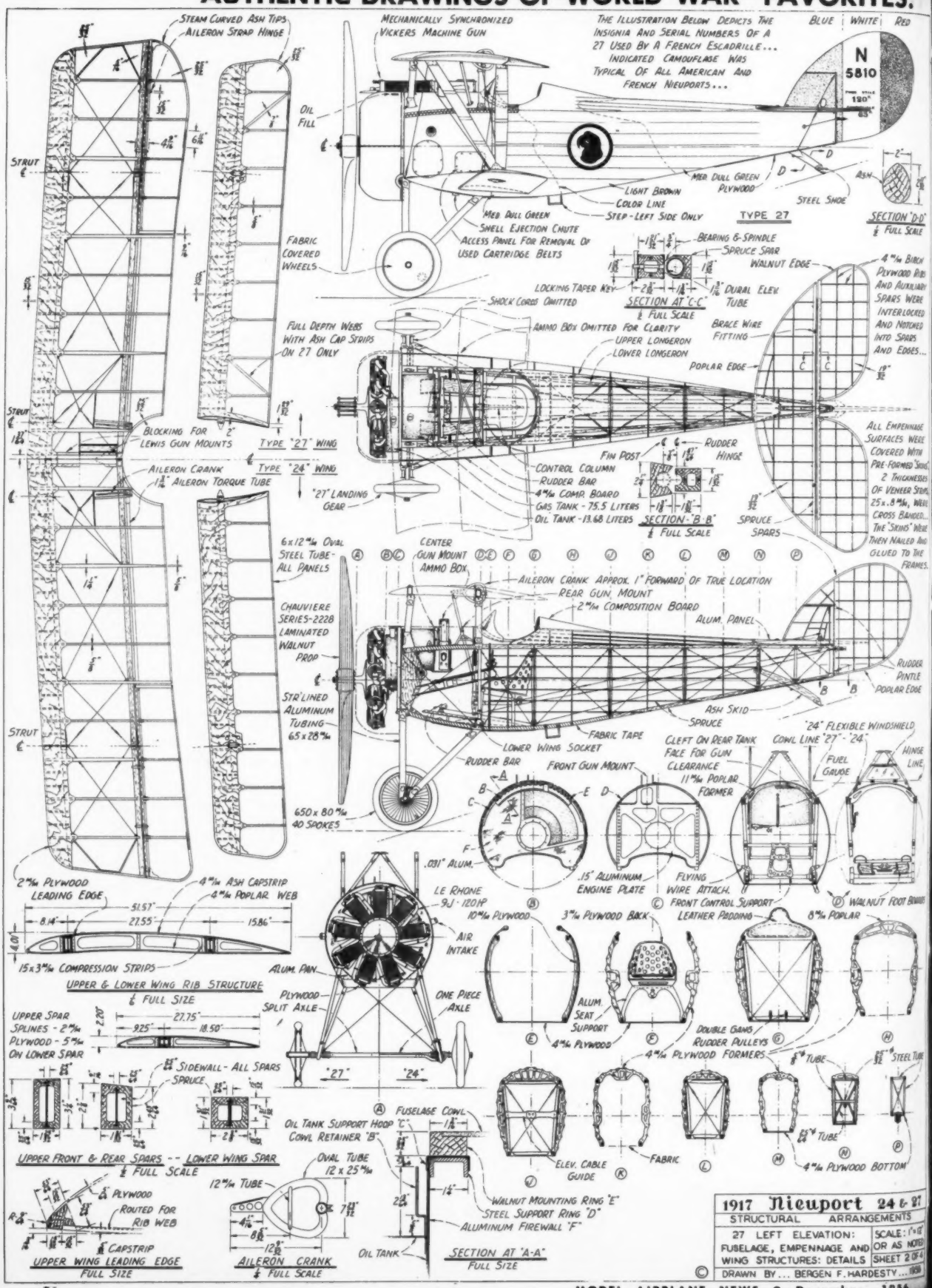
The SEAGULL has been designed to eliminate these complications, both wing halves being constructed perfectly flat on the building board, with no washout or twist being required whatsoever. The model has been thoroughly tested over quite a long period and a second test machine was built by an inexperienced modeler—only his third ship—with excellent results. Simplicity and low building costs are the keynotes of this design, which will give the younger modelers a chance to explore the possibilities and characteristics of the tail-less layout.

FUSELAGE: Cut two identical side panels from 1/16" sheet to the shape shown on the drawing, then mark the former positions on the side panels. Cement formers 4, 5 and 6 to one of the side panels, making sure they are square to the panel in plan view. Allow these to dry before adding opposite side panel, which must be in line with the first side. Carefully placing a few elastic bands around the fuselage will help hold the sides in position and will enable formers 1, 2 and 3 to be fitted by pulling the fuselage sides in a little at the front. When completely set, cover the top and bottom of the fuselage with 1/32" sheet with the grain running across the body, as indicated on the plan. Cement a cube of hard balsa of the appropriate size to the nose of the model. Do not carve and sand the nose to shape until the cement is hard. The three pieces of ¼" hardwood dowel may be fitted into position. These dowels are for the attachment of the rubber bands retaining the wing in position on the fuselage. From .040" dia. wire bend two hooks to the shape given and cement in their respective places on the underside of the fuselage. These tow hooks should be given at least two coats of cement. Lightly sand the body all over, cover with tissue, water shrink and clear dope in the normal manner. A small hole in the top skin of the body forms access to the weight box between formers 1 and 2.

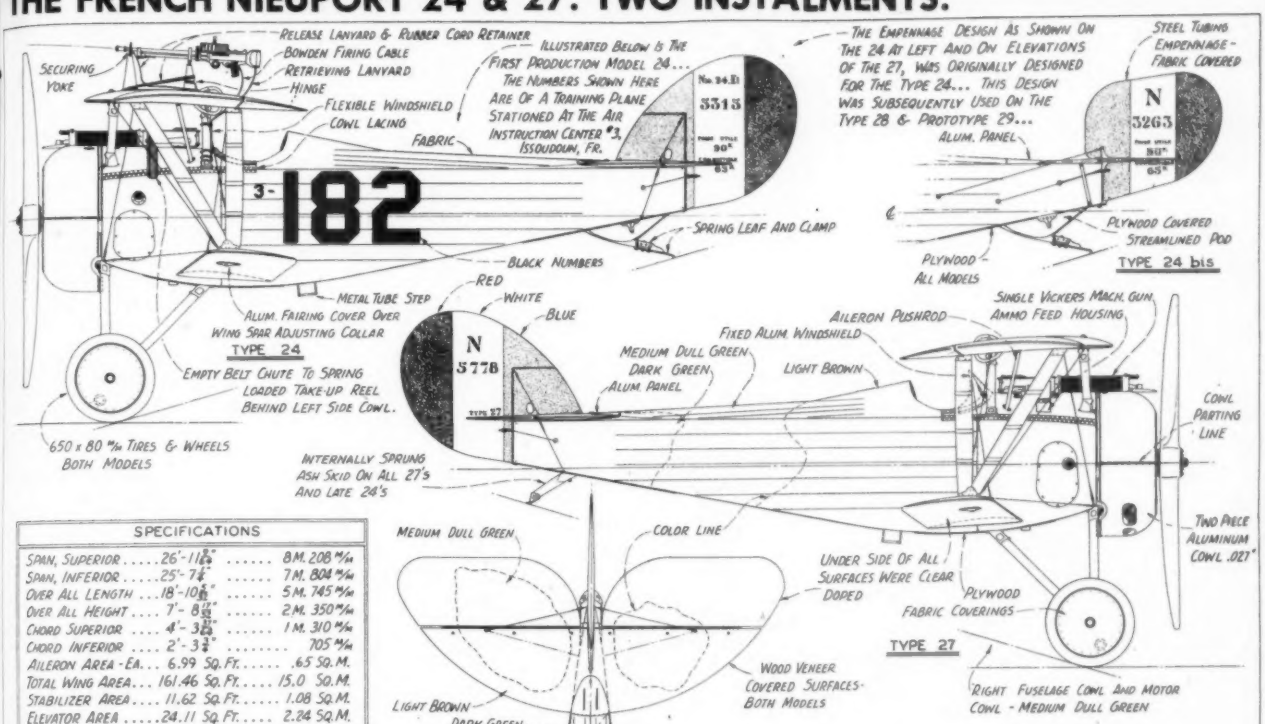
FINS. Trace the tip fin shape on to 1/16" sheet balsa and cut out two fins. Next, cut a slot in the fins 3¼" long x 5/16" wide and insert a strip of balsa with the grain running lengthwise. When cemented up, this stiffens the fins considerably. Sand fins to streamlined section then give three coats of clear dope, sanding between each coat.

WINGS. As previously explained, (*Continued on page* 54)

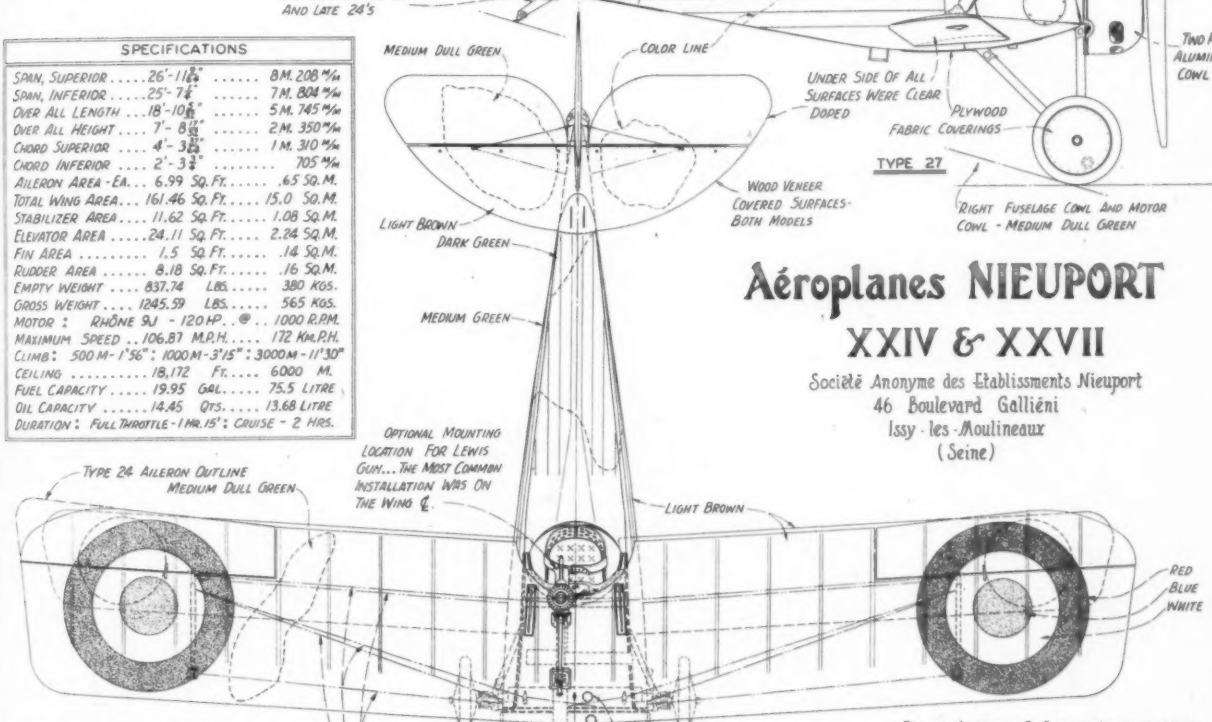
AUTHENTIC DRAWINGS OF WORLD WAR FAVORITES.



THE FRENCH NIEUPORT 24 & 27. TWO INSTALMENTS.



SPECIFICATIONS			
SPAN, SUPERIOR	26'-11⅝"		8M. 208 m/m
SPAN, INFERIOR	25'-7¼"		7M. 804 m/m
OVER ALL LENGTH	18'-10⅛"		5M. 745 m/m
OVER ALL HEIGHT	7'-8⅛"		2M. 350 m/m
CHORD SUPERIOR	4'-3⅛"		1M. 310 m/m
CHORD INFERIOR	2'-3¼"		705 m/m
AILERON AREA - EA.	6.99 SQ. FT.		.65 SQ. M.
TOTAL WING AREA	161.46 SQ. FT.		15.0 SQ. M.
STABILIZER AREA	11.62 SQ. FT.		1.08 SQ. M.
ELEVATOR AREA	24.11 SQ. FT.		2.24 SQ. M.
FIN AREA	1.5 SQ. FT.		.14 SQ. M.
RUDDER AREA	8.18 SQ. FT.		.16 SQ. M.
EMPTY WEIGHT	837.74	LBS.	380 KGS.
GROSS WEIGHT	1245.59	LBS.	565 KGS.
MOTOR : RHÔNE 9J - 120 HP. @			1000 R.P.M.
MAXIMUM SPEED	106.87 M.P.H.		172 KM.P.H.
CLIMB: 500 M - 1'56" : 1000 M - 3'15" : 3000 M - 11'30"			
CEILING	18,172	FT.	6000 M.
FUEL CAPACITY	19.95	GAL.	75.5 LITRE
OIL CAPACITY	14.45	QTS.	13.68 LITRE
DURATION : FULL THROTTLE - 1 HR. 15' : CRUISE - 2 HRS.			



Aéroplanes NIEUPORT

XXIV & XXVII

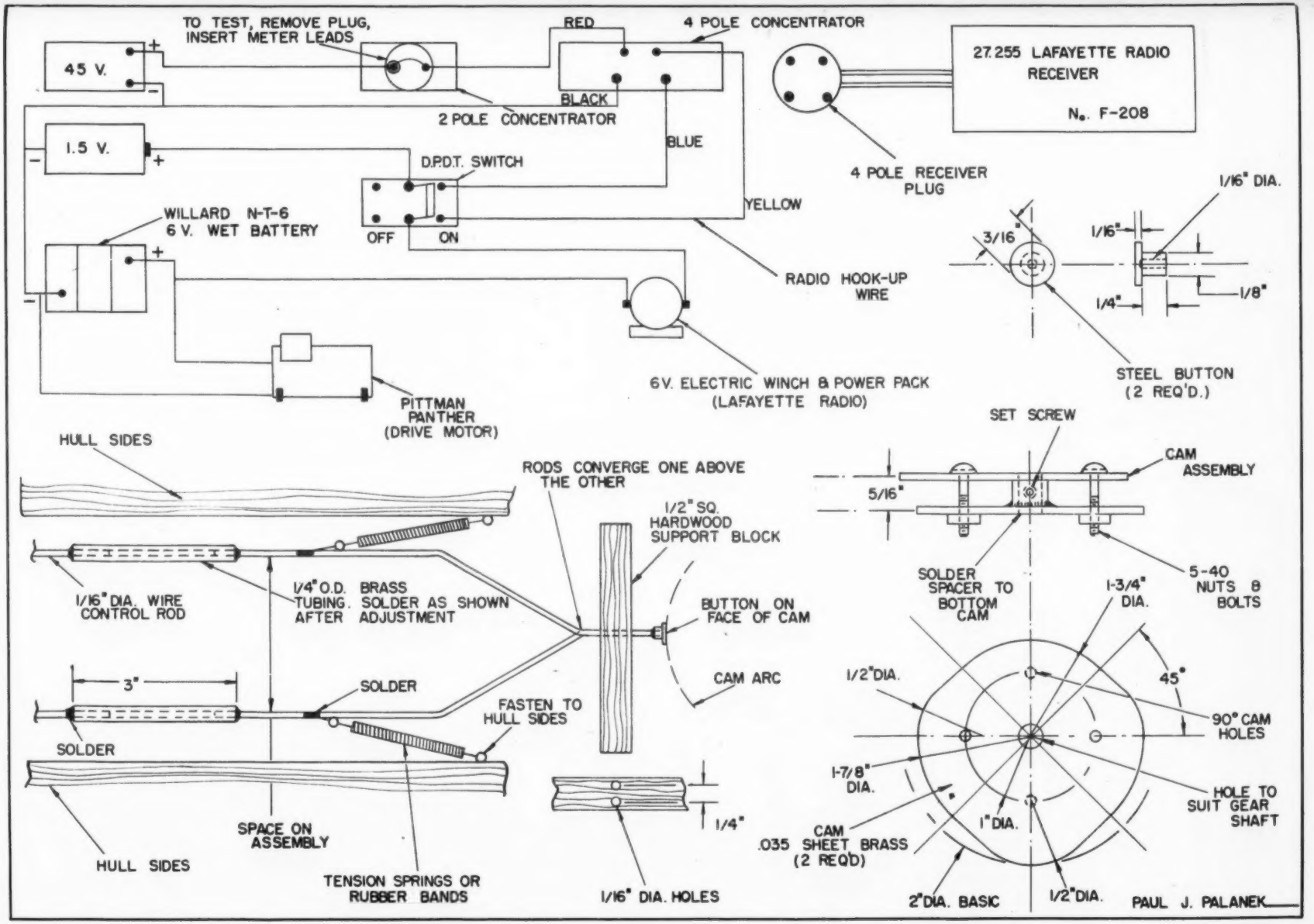
Société Anonyme des Etablissments Nieuport
46 Boulevard Galliéni
Issy-les-Moulineaux
(Seine)

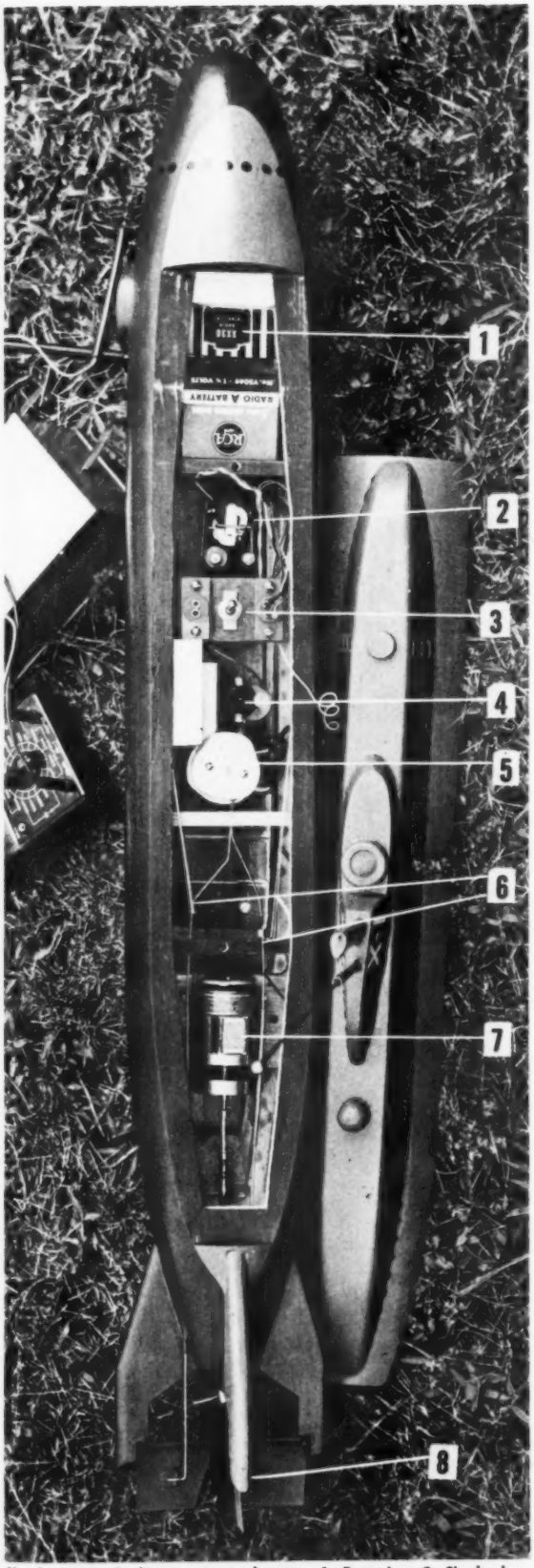
THE 24 & 27 WERE EQUIPPED WITH ONE OF THREE TYPES OF PROPELLERS:
CHAUVIERE - SERIES 2228 (ILLUSTRATED)
LEVASSEUR - SERIES 549
REGY - SERIES 354

FRENCH, AMERICAN & ENGLISH INSIGNIAS WERE DISPLAYED IN LOCATIONS AS SHOWN... THE INSIGNIA WAS USED ON THE TOP & BOTTOM OF THE UPPER WING & ON THE BOTTOM ONLY OF THE LOWER WINGS... THE BRITISH 27's WERE GENERALLY ALL SILVER, WHILE FRENCH & AMERICAN 27's WERE CAMOUFLAGED AS NOTED... THE CAMOUFLAGE PATTERNS WERE ALIKE ON ALL PLANES AND THE LOWER SIDE OF ALL SURFACES WERE CLEAR DOPED.

IN ADDITION TO THE PRODUCTIONS BY THE "SOCIETE ANONYME DES ETABLISSEMENTS, NIEUPORT," COMPLETE NIEUPORT AIRCRAFT WERE PRODUCED BY - "C.E.A. - SOCIETE POUR LA CONSTRUCTION ET L'ENTRETIEN D'AVIONS, 63, BLVD. BESSIERES" AND - "R. SAVORY ET H. DE LA FRENAYE, ATELIERS D'AVIATION."

1917 Nieuport 24 & 27 GENERAL ARRANGEMENT	
24 LEFT ELEVATION: 27 RIGHT ELEVATION: PLAN & FRONT ELEVATION: 24 bis EMPENNAGE	SCALE: 1" = 12" OR AS NOTED
DRAWN BY... BERGEN F. HARDESTY... 1956	SHEET 1 OF 4


TO TEST, REMOVE PLUG, INSERT METER LEADS
45 V.
1.5 V.
2 POLE CONCENTRATOR
RED
BLACK
4 POLE CONCENTRATOR
BLUE
YELLOW
D.P.D.T. SWITCH
OFF
ON
WILLARD N-T-6 6 V. WET BATTERY
RADIO HOOK-UP WIRE
27.255 LAFAYETTE RADIO RECEIVER
No. F-208
4 POLE RECEIVER PLUG
6V. ELECTRIC WINCH & POWER PACK (LAFAYETTE RADIO)
PITTMAN PANTHER (DRIVE MOTOR)
1/16" DIA.
3/16"
1/16"
1/4"
1/8"
STEEL BUTTON (2 REQ'D.)
HULL SIDES
RODS CONVERGE ONE ABOVE THE OTHER
1/2" SQ. HARDWOOD SUPPORT BLOCK
1/16" DIA. WIRE CONTROL ROD
1/4" O.D. BRASS TUBING. SOLDER AS SHOWN AFTER ADJUSTMENT
BUTTON ON FACE OF CAM
CAM ARC
3"
SOLDER
FASTEN TO HULL SIDES
SOLDER
SPACE ON ASSEMBLY
HULL SIDES
TENSION SPRINGS OR RUBBER BANDS
1/16" DIA. HOLES
1/4"
SET SCREW
CAM ASSEMBLY
5/16"
SOLDER SPACER TO BOTTOM CAM
5-40 NUTS & BOLTS
1-3/4" DIA.
1/2" DIA.
45°
90° CAM HOLES
1-7/8" DIA.
HOLE TO SUIT GEAR SHAFT
1" DIA.
CAM .035 SHEET BRASS (2 REQ'D)
2" DIA. BASIC
1/2" DIA.
PAUL J. PALANEK



Hatch removed shows, top to bottom: 1—Batteries; 2—Single-channel receiver; 3—Switch and plug panel; 4—Victory winch; 5—Cams; 6—Twin pushrods; 7—Pittman Panther motor; 8—Control Surfaces.

Using transmitter, test set, designer checks batteries under load.

FAIRCHILD GUPPY

PART TWO

Airplanes too tough? Boats too dull? Then try this radio-controlled submarine. Works under water. This month, gear is installed.

By PAUL PALANEK

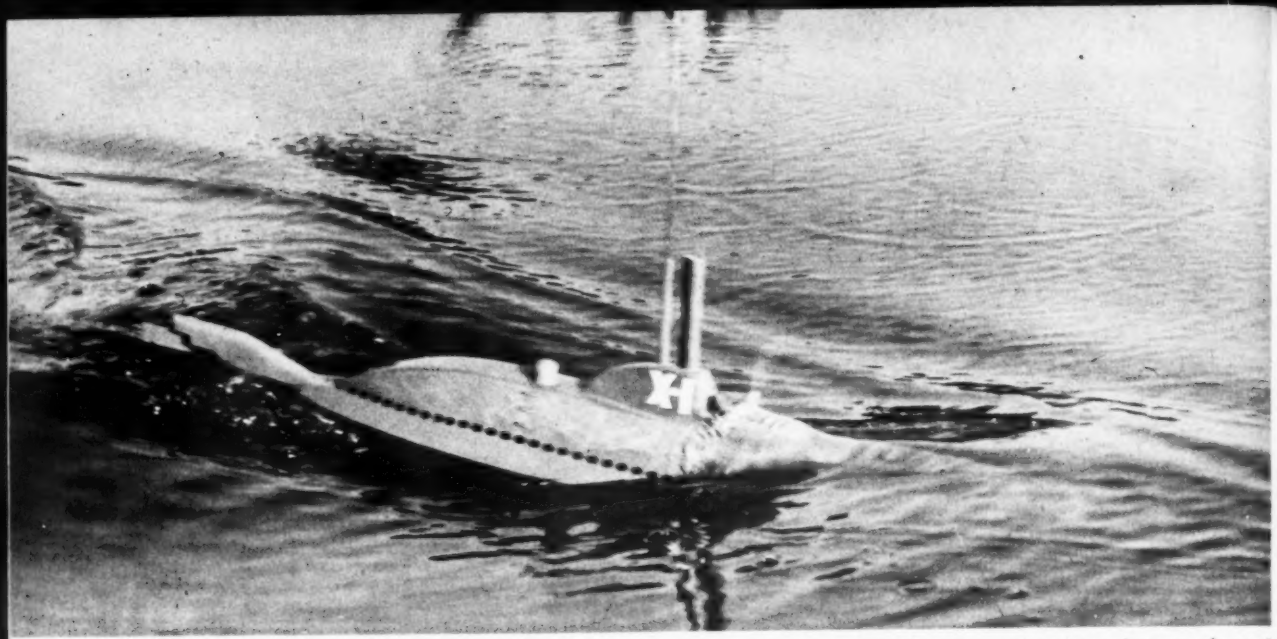
► In the preceding instalment, we discussed the construction of the hull of our scale mini-sub. This month, we shall go into the installation of the radio gear and control mechanisms.

Almost any of the standard single-channel receivers can be used. Nothing elaborate is required. Since the model may never be more than 100 feet or so from the transmitter, great range and sensitivity is not required. Various two-tubers of the Lorenz type, the hard tube receivers like the Citizenship and the Lafayette, which I happened to use, all are acceptable. The 6-volt power winch also was bought from Lafayette, but also is available through Polk's and others.

We mentioned earlier that a lead ballast of some 10 to 14 pounds will be required to submerge the hull to proper water-line depth. Three cast sections are used, approximately 3⅜ to 4½ lbs. each. The bottom of an empty dope can will fill the bill for the mold. Lead melts carefully, but do take care when working with molten metal. When cast, and fitted to the hull, fasten in place in the lower block balsa housing. Use 6 #10 wood screws approximately 2½" long. Bear in mind that the sub must have most of the heavy gear loosely installed for proper ballasting.

A ¼" plywood motor mount is constructed as shown and fitted to the hull, using trial and error methods. Bolt the Pittman Panther motor and fly wheel assembly in place. Install in the hull at position shown, using #3 wood screws. The drive shaft is left to the choice of the builder. Both screw shaft and bearing can be used, which is called out on the drawing or, the builder's choice installed. In any event, a hole of suitable size is drilled in the center of the

(Continued on next page)



Jules Verne? Who he? There may be no giant squid to worry about but you sure do have to watch for the motor boat boys when you submerge!

stern and the shaft assembly installed. Be certain of a good fit. Between the fly wheel and screw shaft, fasten a spring wound coupling. A 2" dia., 3 bladed high pitch screw is employed. Check the packing, should packing be used for a good water tight seal. Be certain the packing is oiled, for good wearing qualities. All these items are to be found in better hobby shops.

From .035 sheet brass, shape the two actuating horns which in turn are fastened to the control surfaces. A 1/16" hole is drilled in each to receive the control rod. Solder the horns in place on each surface. In line with the horn and parallel to the boat center line, drill a 3/16" dia. hole, one each for the control rod bearings. Two pieces of 1/16" inside diameter brass tubing are forced into the drilled holes with the hole being such that the control rods ride freely in each.

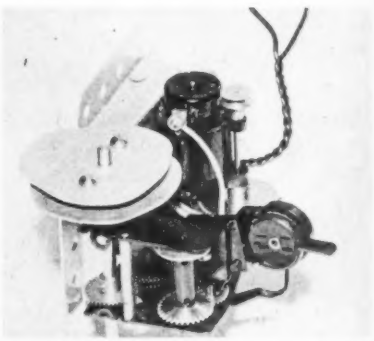
The pictures show the relative position of all components. Installation of gear can now be started, securing permanently in place. Up in the bow are the 45 volt and 1½ volt batteries. Next comes the receiver. Above this are the concentrator clips mounted to a ¼" plywood cross brace. Amidships is the motor winch with cams fastened in place. Finally, comes the Willard battery and the Pittman motor.

Fasten the receiver forward, and close to the hull bottom. Four screw eyes hold the rubber band suspension unit in place. Ahead of the receiver are the receiver batteries. These can be secured in place using a metal or wood strap.

Since there is no fear of leakage from the Willard rechargeable battery, this unit can be placed on its side and secured to the deck forward of the Pittman motor. We might mention, while on the subject of motors, a signal does not start the motor. This is a manual operation. The hatch is then installed, bolted in place, and you are set to launch. Once you get familiar with it, the starting and launching operation gets to be a snap.

The cams are shaped as indicated on the drawing. Use .035 sheet brass. Solder to the lower cam the spacer bushing of sufficient length so, when complete, the cam center lines will have a ¼" gap. Two 5-40 bolts hold the upper cam in place. The positioning of the cams relative to one another is left to the builder. We concluded that the most advantageous setting is to stagger the cams, one above the other. A set screw secures this assembly to the winch drive shaft. Mount the cam assembly as shown amidships, fastening the winch assembly to a piece of hard, ¼" x 3" sheet balsa. Secure the balsa to the hull walls, keeping slightly below the hatch line.

Follow the wiring diagram, at the same time making a neat installation by fastening the wire to the hull in the shape of a cable. The antenna lead-in is clipped to the metal antenna, and can be removed when required. Check the drawings for proper arrangements and materials used. The hardwood cross brace supports the control rods, at the same time acting as a spacer and bearing. The brass tube coupling, (two units) are soldered securely after final adjustments are made. The wide-face steel buttons ride the cam face and should be soldered to the tips of the control rods. To keep the rods in positive contact with the cam, spring or rubber band load as indicated. Bear in mind that the cam coupled to the gear train develops approximately 7 lbs. of

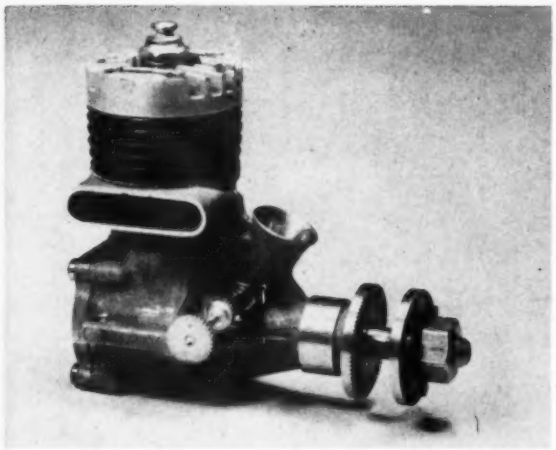


Victory winch with home-made cams attached. Cam positions changed for special maneuvers.

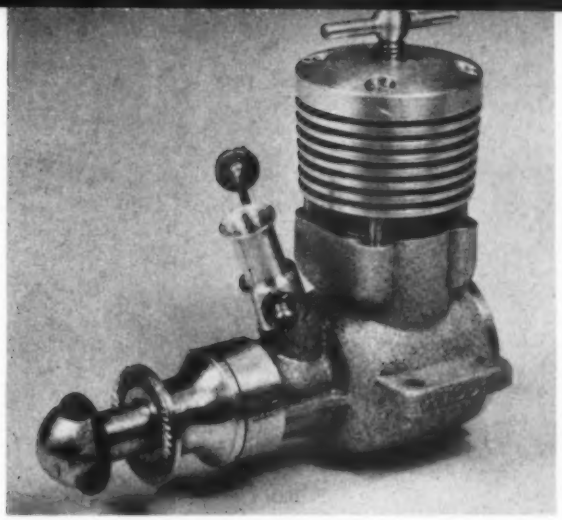
push, so be certain the load at the cam is not more than 1½ to 2 lbs. maximum. Adjust the spring or rubber band tension accordingly.

For testing the gear, follow the manufacturer's instructions to the letter, and make necessary mechanical adjustments. Check the hull for water seepage. Some water may creep in, but keep it to a low level. Incidentally, be certain the hull cavity is fully waterproof because expanding wood will split the seams. Several coats of clear lacquer should solve the problem.

With the sub under way, a speed of some six to eight mph should be reached prior to testing for diving. The length of time the control rod dwells on a cam lobe determines the length of the executed maneuver. Time as well as experience will permit the proper length of cam dwell. The staggered cams have four dwell points each. For diving sequence, we have dive, normal, surface, and normal. For direction we have left, normal, right, and normal. Bear in mind that shifting the cams will give different (*Continued on page 42*)



A top-notch .15, O.S. Max-1 from Japan is popular in Australia.



Only 1,000 Oliver Tigers made in two years. Hottest Diesel made.

Import Review

By P. G. F. CHINN

Another in a series of round-ups of foreign engines, presented for information and interest. Here's four of latest from abroad.

► You may ask "Why Imported Engines? Don't we produce good motors right here in the U.S.A.? What about the domestic manufacturer? Shouldn't we think of our own industry first?" To which we, in reply, would venture to say this:

The American model industry is the biggest in the world. It produces at least a dozen times as many motors per year as its nearest rival, Great Britain, and many of its leading manufacturers turn out as many engines in a week as some foreign makers build in a year. American factories are equipped with automatic machines on a scale which scarcely any foreign manufacturer can ever hope to afford. In one Californian factory, for example, high-quality model engines come off the production line at the rate of 100 motors per hour. Most foreign makers, on the other hand, produce little more than that number in a week and one famous foreign contest engine manufacturer takes two months to turn out each hundred units. The average American model engine, too, is a first rate job: powerful, well-made and reliable.

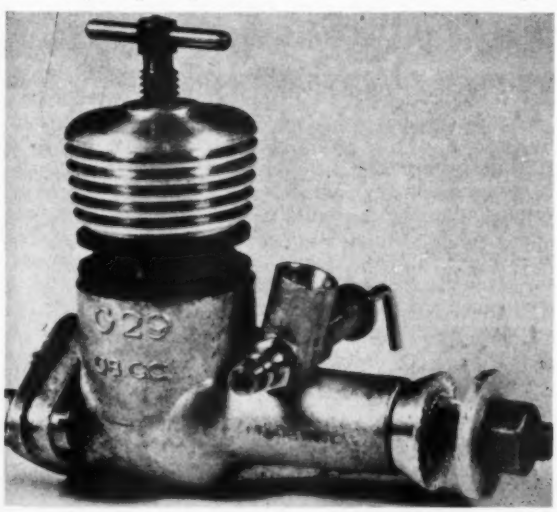
The Oliver Tiger Mk. III

A typical case in point is the British Oliver Tiger Mk. III shaft-valve Diesel. A beautifully constructed article which fully justifies the description "precision-made," it makes no concessions whatsoever to the requirements of mass production. Only a dozen of these motors are produced each week, despite the fact that the makers could sell many times this number.

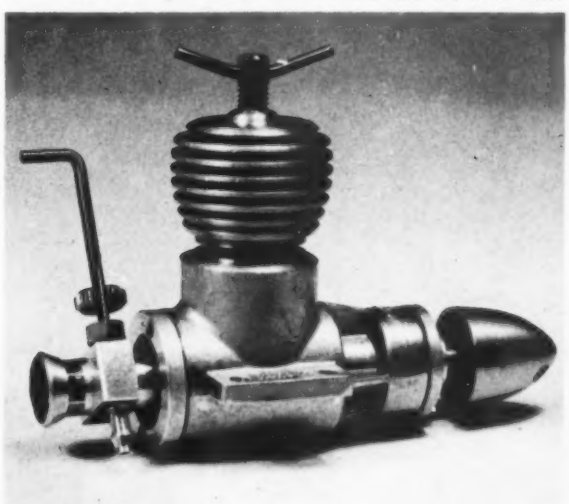
The standards of fits and finishes on this motor are unsurpassed. Even its glittering shot-blasted crankcase casting and finely finished machined parts seem strangely unfitted for the smelly contamination of diesel fuel.

For several years the Tigers have been virtually unchallenged in the up to .15 cu.in. model car class. Today, Oliver Tiger engines hold every British class record (and that means virtually all equivalent European and World class records) from ¼-mile to 10 miles in both the 2.5 c.c. (.15 cu.in.) and 1.5 c.c. (.09 (*Continued on page* 36)

Italian Super Tigre's spectacular. This is G. 29 Half A. Compact.

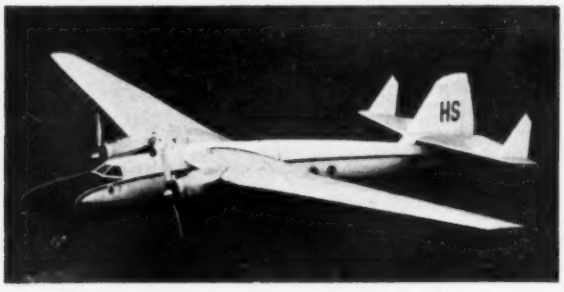


From West Germany is Taifun Hurrikan .09, twin BB, reed valve.

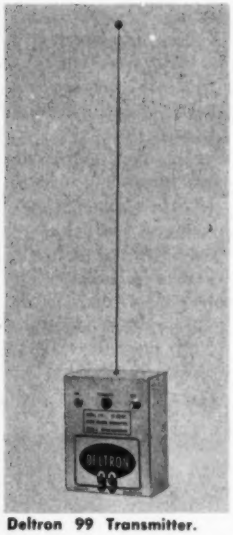


Two Veco 27 tugs herd a nine-foot, 390-pound battleship. One tug had Babcock 465 two-channel, the other Babcock three-channel, 27.

In Germany, this multi-channel Funkstar is counterpart of American Live Wire. Span is about five feet. High stabilizer interesting.

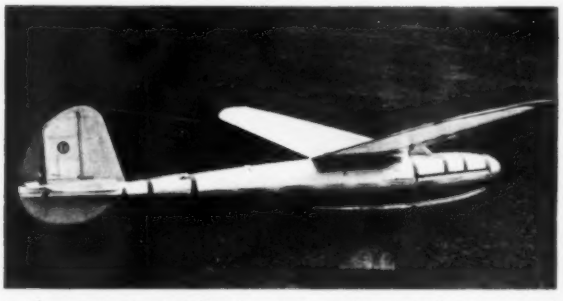


One of the finest models in Germany, seven-foot, twin-engine scale Ambassador, built by 60-year old modeler. Wish we had the details!



Deltron 99 Transmitter.

RADIO CONTROL NEWS



Belgian glider by Mabille, has both rudder and elevator control. Streamlining of this machine must make it an efficient RC soarer.

By EDWARD J. LORENZ

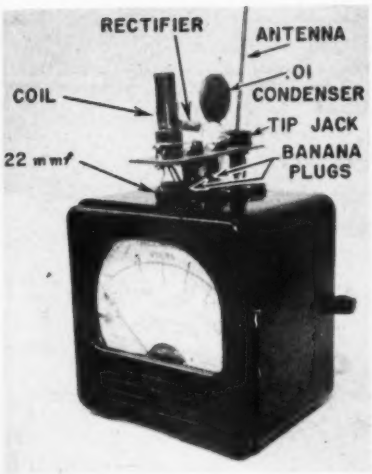
News and latest developments from far and wide. Technical tops • News items • Beginner notes • Foreign Round-up • Many tips.

Radio controlled gliding is popular in Switzerland, which country is made to order for soaring. This model is international winner.

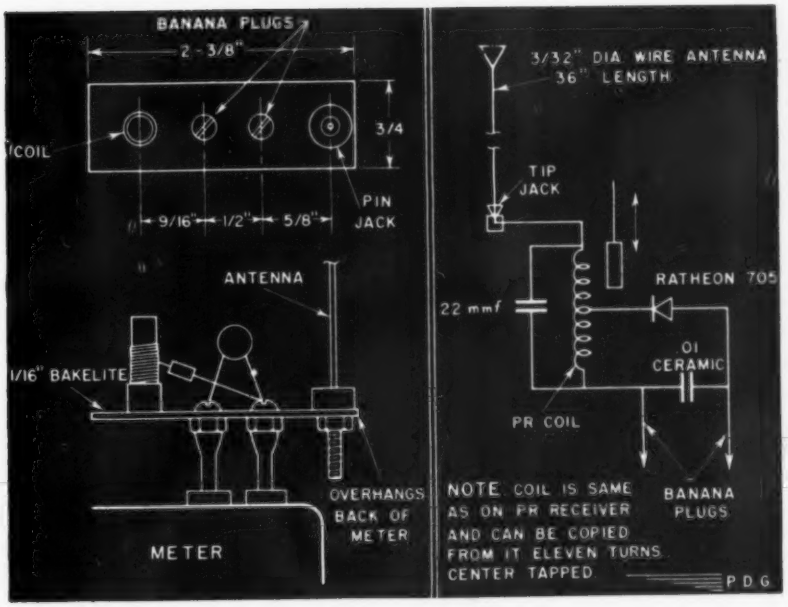
CLUB NEWS

► The year of 1956 is just about over and we've seen quite a few new circuits and gadgets in the RC line, to say nothing of much improved flying. Multi-channel flying is improving, mainly due to pilot experience. RC fliers in England and in Europe now appear to be even with us in the plane design field and, in some cases, a little ahead in equipment design. Perhaps this last statement will start controversy in this country. However, competition in any field is what makes for advancement of the art. The coming year should bring out many more improvements, a few rule changes and perhaps new operating frequencies. In the meantime, let's see what has been going on during the latter part of our normal flying season.

The New York Mirror Meet, held at Floyd Bennet Field on Labor Day, had a well run RC event under the direction of Jerry Stoloff. The dull overcast and misty day held



Versatile Citizenship meter for volts and mils, can be used as field strength meter, as shown.



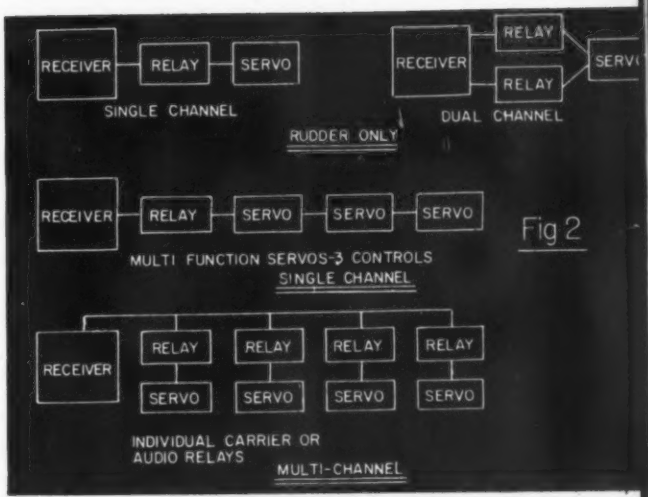
Right—This diagram and schematic shows how a simple unit is plugged into meter conveniently.

the entrants to a low number. 80% of the entrants were on 27mc with but one or two each on 52 and 465mc. Rudder only was won by Dick Allen of Vestal, N.Y. and the multi-channel event was won by Tex Henkelekin. The most unusual piece of equipment which we saw, was the system used by Dick Allen and Ralph Jackson (5th in rudder only). This was a true proportional system, operating from a pulsed transmitter and using a single-channel tone receiver. The novel feature was the absence of a flapping control surface and the ability of the control surface to follow exactly the movement of the control stick. The power of the actuator was phenomenal and as far as we could determine, the operation was practically foolproof. The receiver and transmitter are marketed by Valley Electronics, Vestal, N.Y., with the actuator slated for release about the first of the year. The multi-channel fliers used Babcock three channel equipment and a variety of reed equipment, including CG Electronics, Bramco and Schmidt. Considering the 300- to 500-foot ceiling that prevailed, the flights in general were up to par.

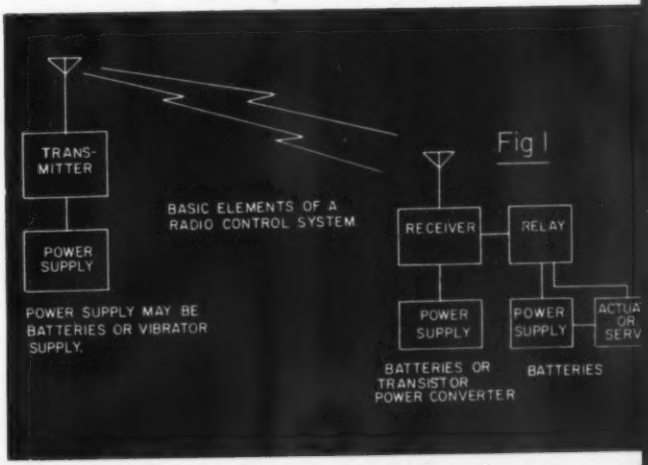
From Bill Kenyon, Manlius, N.Y., comes news of RC events from the western end of the Empire State, delayed a bit from last month's column. At their "Hobo" meet, held about the first of August, they had no instance of interference. This was due to plain common sense and a little courtesy. Seventeen flights out of a total of over 200 were on 465 mc, all made from in a two day period. Bill has a 7½' Cub J-3 which weighs 8½ pounds and is powered by a Fox .35, a very popular engine for large RC models. Control is via a Lorenz 2-tuber on rudder and engine and a Citizenship 465 for the elevators. Pete Bliss and Ralph Miller of Corning, New York, have a new circuit for giving rudder or elevator from a single channel. Bob Sherwood of the Syracuse Sky Knights had his 1300 square inch SE-5. Weighing 9 pounds, it was powered by a Fox .35 and had a 5-channel Schmidt RC unit. It was a real crowd stopper, Hal deBolt had his new symetrical biplane with a 5-channel Schmidt unit that did inside and outside loops, plus anything else that was called.

We'd like to mention again that if you want a notice in the column regarding an RC meet, get-together, etc, please get the information in as soon as possible, preferably 2 to 3 months in advance.

That red hot outfit from the (*Continued on page 46*)



"Chain of events" that takes place when you press a keying switch.



Typical set-ups. Although servos indicated, escapements also used.

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FOREIGN NOTES

A monthly world-wide round-up of technical developments, designs, significant industrial products.

P. G. F. CHINN

German Nationals.

From time to time we have mentioned the rapid development of the hobby in Western Germany. Almost every month brings news of impressive achievements which are all the more creditable when one remembers the retarding effect of the official ban on model fiying in Germany that was imposed for some considerable time after the war. Thus, as befits a well established modeling movement, the 1956 German National Free-Flight Championships was a full four-day meet held, Thursday to Sunday, August 9-12 at Kassel and a film of the events was subsequently featured on TV. Events were for towline gliders, free-flight gas, Wakefield, flying-wing and radio-control. (1956 control-line events were held as a separate meet.)

Attending the meet, at the invitation of the German Aero Club, were three indefatigable enthusiasts from the USAF Chad Club from Chateauroux, France: John (Stew) Stewart, Chuck Koski and Ray Poisson. Sharing camp with them was the noted Stuttgart model designer, Karl-Heinz Denzin. The presence of the American visitors did not escape the notice of the press and Friday's issue of the *Kasseler-Post* carried a solid write-up and a photo of "die drei Amerikaner."

Comment of John Stewart on the meet is interesting because it is always valuable to have, for this column, a glimpse of the foreign scene as viewed, first hand, through American eyes. Most impressive, it seems, was the Wakefield flying. This took place on the second day when the weather was cool and with gusty wind. Max after max was chalked up despite a general lack of thermal activity. Glider events (first day) were for both Nordic A1 and A2 classes. Many copies of World Champion Rudolf Lindner's famous *Spinne* ("Spider") A2 were seen and standards of flying were high.

On the third day (Saturday) the F/F glas events were held. Most popular motors were Webras with the older .15 Winner and .09 Rekord showing up even more than the more powerful Mach-1. Two ships having the hot new glow version of the Mach-1 were also seen, one of which had about the fastest climb of any model at the meet.

The radio event resulted in another win for maestro Stegmaier ("never met a nicer, more modest man in my life," says Stew) flying a new version of his familiar pneumatic servo layout. Motor is now a Ruppert (custom-built) .42 cu. in. flat-twin Diesel (similar to that briefly described in an earlier FN) with built-in compressor operating an 8-channel servo system: rudder, elevator, motor and parachute drop. Also of much interest was a semi-scale Skyray delta flown into 4th. place by ex-yoyo pilot Wilfred Biesterfeld. We hear that great things are expected of this model next year.

Japan

We imagine that Sigeo Ogawa, manufacturer of the O.S. engines, must be feeling pleased with the performance of his

C. Culver, Pretoria, South Africa, with his winning, free-flight scale Aeronca four-place.

Brazilian team race enthusiasts at lively inter-city contest between Sao Paulo and Campinas.

Newtown club modelers, at a Brisbane affair in Australia. This is real stunt happy crew.

Max .15 motor in powering the winning British model in the recent World Free-Flight Gas Championships. World Champion Ron Draper had this to say about the motor afterwards: "These engines (I have two) are delightful to handle and do not suffer from critical needle-valves as do most of the small glowplug engines. The prop I used was a stock 8 x 3½ Top Flite and the O.S. .15 turned this at a neat 15,000 rpm. Both my Max .15's are capable of turning over like this, which speaks well for their workmanship. I have used all types of Diesel .15's as well as glow motors and am not fussy about the type I use for free-flight. The one big thing in favor of glow engines for F/F is their light weight and with models the size I use, this is very helpful. The model I used at Cranfield was to the maximum permissible area (650 sq. in. total) for 17½ oz., so you see a light engine was useful."

Israel

As we mentioned once before in this column, Israel has no model industry and practically all supplies have to come from overseas. These supplies are very severely limited due to import restrictions, and among various schemes instituted by the Aero Club of Israel to make best possible use of available resources is a plans lending library. As well as drawings of the standard Ae.C.I. "club designs" which have been specially prepared by Naftali Kadmon and other noted Israel designers, the library includes plans of all types of models from many countries. The plans are loaned to modelers all over Israel (by mail) there being a deposit of one Israel pound (about 70 cents) and a limit of two weeks for holding any plan.

If any reader of this column who has an unwanted plan or two, would like to contribute them to a worthy cause, we feel sure that any such drawings would be greatly welcomed by the Ae.C.I. Address them to this column or direct to: Mr. Naftali Kadmon, Aero Club of Israel, 6 Hama'alot Street, Jerusalem, Israel.

Hungary

Prototype of a new .09 Diesel that has just appeared in Hungary is the 1.5 c.c. Alag X-04. This is a shaft valve, radial port job, similar to the 2.5 c.c. Alag X-3 which, for power, is one of the best .15 cu. in. Diesels we have so far encountered from east of the Iron Curtain. The new X-04 has a bore and stroke of 13 x 11.2 mm. (1.486 c.c. or .0907 cu. in.), is said to weigh only 2.2 oz. and to deliver its peak output at 12,500 rpm.

Canada

We have always been a bit doubtful about including Canadian news in Foreign Notes. We therefore crave the indulgence

(*Continued on page 56*)

Import Review

(*Continued from page* 29)

cu.in.) car classes, including an 88.24 mph in the .15 cu.in. category. In "A" class team-racing, which is highly popular and hotly contested in Britain and on the Continent, the Oliver Tiger is considered a must, for the Oliver racers hit speeds as high as 90 mph and with unrivalled fuel economy. In FAI free-flight, more and more contest men are turning to the Oliver-Tiger. Last year it won the World f/f Championships.

The Oliver Tiger Mk. III is the most powerful .15 class motor the world has yet seen. On our standard dynamometer test, we checked the output of a stock model at .305 brake horsepower at 14,000 rpm. This is the highest figure recorded for a .15 motor and the highest ever, on a displacement basis, achieved by a Diesel, irrespective of size. The actual maximum torque registered was some 24 oz.in., which is equivalent to a brake mean effective pressure of 63 lb./sq.in. (The best bmep we recorded in over 100 tests was 67 lb./sq.in. with a Series 20 McCoy. The average model motor develops a bmep of around 50 lb./sq.in.) This, of course, means that, potential maximum apart, the motor is able to deliver much above average power at moderate revs and will lug a really big prop if required.

Structurally, the Tiger-III features a sandcast crankcase, shot-blasted on the external surfaces. Integral is the main bearing housing, in which a ⅜ x ⅜ inner, and a ½ x ⅝ outer, ball journal bearings are accurately alined. The shaft, which is of 65-ton steel, has a counterbalanced web and is casehardened on the crankpin only. The shaft carries an extended prop driver on a tapered split collet. A 5/16 o.d. sleeve nut and washer complete the prop drive assembly.

The flanged cylinder sleeve is of carbon steel, cyanide hardened, ground and honed. It has 360 degree porting in the form of four exhaust ports, between and below which are four inclined circular section bypass ports. The conical crown piston and matching contra-piston are of high-grade cast iron. A closely fitting finned barrel machined from high-grade alloy bar stock completes the cylinder components. Four through-bolts tie the cylinder assembly to the main casting, clamping the sleeve axially and thus obviating any risk of undesirable radial loading.

Despite its performance, the Tiger handles nicely and is quite easy to start. For smooth running, a fuel of improved cetane rating, containing between 3 and 5 percent amyl-nitrate, is recommended. The motor has a bore and stroke of .550 x .625 in., giving a displacement of .148 cu.in. or 2.43 c.c. It weighs 5½ oz.

The Oliver Tiger is a design which readily lends itself to re-working for extra performance. The makers will, in fact, supply a specially tuned motor to order.

Engines of this kind can never be cheap. The Tiger Mk. III sells at $24.95 stock, or $32.95 modified.

The O.S. Max-1 .15

The Max 15, like the Oliver just described, is a shaft-valve 2.5 c.c. class motor and a good one. Beyond that, the two are totally dissimilar.

The Max 15 is a small brother to the Max 35 model described in an earlier Import Review. Like most Japanese engines, it approximates much more closely to American design trends than motors from other foreign countries. It is a glow-plug motor, has a plain, bushed, main bearing, is of the opposed port, or loop-scavenged type and follows U.S. trends in respect of its general layout.

However, whereas modern U.S. production methods have almost eliminated machining operations on diecastings, the O.S. engines still have machined flange faces, and bored venturis and also retain the pleasing decorative effect of clean-cut polished edges on such items as the prop driver, exhaust stack, crankcase nose and cylinder head. Admittedly, the worth of such extra finishing, in terms of performance, is precisely nil, but, set off by the pleasing sandblasted grey matt surface of the diecastings, it is nice to see all the same.

The crankcase is a well executed pressure casting embracing the main bearing, with cast-in bronze bush, intake, exhaust stack and bypass passage. The intake is bored 7 mm. (approx. 9/32 in.) and is provided with a removable choke insert or restrictor, which is held in place by a well made spraybar located close to the crankshaft port. Provision is made for an extra spraybar for two-speed operation. The shaft is of the full disk web type, with crescent counterweight which balances half the conrod weight. The main journal is 8 mm. diameter (just over 5/16 in.) and features a 6 mm. intake passage and a rectangular intake port which gives an unusually long induction period of more than 200 degrees of crank angle.

The cylinder is of conventional design with integral cooling fins, blued against corrosion. An impregnated asbestos composition gasket is used to make the joint between the cylinder and case, and again between the cylinder and head. The latter is a superior diecasting, held down with six Phillips screws, two of which pass through into the main casting to secure the entire cylinder assembly. The piston is noted for its light weight and is provided with a full floating wrist pin with brass end pads.

On test, we found the Max 15 easy to start, very powerful and not at all fussy. With the venturi reducer in place and running on a 25% nitro content fuel, we checked the output of our test sample at fractionally under .27 bhp at 15,000 rpm. This puts the motor up among the leaders in its class. The Max .15 is very compact and weighs 3½ oz.

The Taifun Hurrikan

This, the latest Diesel from the noted West German model firm of Johannes Graupner, is of generally similar construction to the other models from this maker, but for one important exception. Whereas all previous Taifuns have been of the rotary valve type (either shaft or disk), the .09 cu.in. Hurrikan uses a reed type induction system. This is also the first Taifun motor of under .15 cu.in. displacement to be fitted with a ball bearing shaft.

The design of the reed-valve unit is generally similar to that of the pioneer Cox .049 Thimbledrome motor, except that the two reeds are of .003 and .005 in. spring brass instead of copper-berrylium. The carburetor, too, is almost identical, having a needle-valve assembly located in a separate fitting outside the venturi to meter the fuel, which is then admitted into the venturi via four jets placed at 90 deg. intervals.

The rest of the motor largely follows standard European diesel practice in that the cylinder is of the reverse-flow scavenged type utilizing Arden type porting, conical crown piston and screw on finned alloy barrel. The finish on all parts is very good.

On the performance side the Hurrikan is surprising. Showing little advantage over

(*Continued on page* 63)

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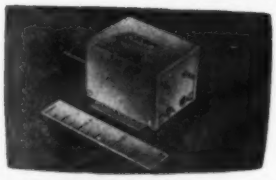

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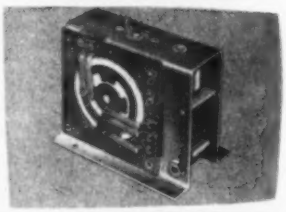

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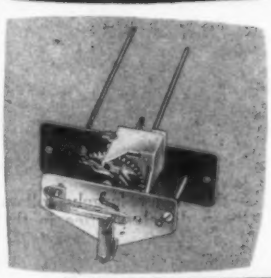

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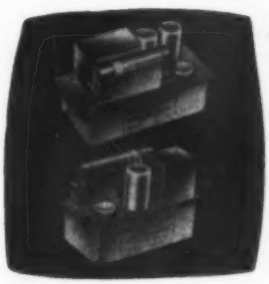

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Snoopy

(*Continued from page* 20)

be cemented across the very tip of the nose to draw the sides together while the blocks are drying. This will make the nose conform to the top view curve and ultimately with the spinner. This is removed when cement had dried.

Shaping the nose blocks can be done either with a sharp knife or coarse sandpaper. We prefer using a very coarse sandpaper and gradually switching over to smoother grades as the blocks take shape. To get a more perfect match between the spinner and nose, hollow out the blocks and cut a hole in top, sufficient to accommodate the engine. Install the engine and spinner and mark spinner base outline with a soft lead pencil. Remove the engine and finish the sanding process. With the pencil marks as a guide, the spinner can be held in place to check the sanding operation until the job has been completed to satisfaction. All that remains is cutting a drain hole, building up a false radiator, installing the wire hooks to the top wing pylon, and completing the pylon sandwich by cementing the two outer 3/32" sheet pieces in place. After the final sanding has been done to the fuselage, the wire hold down hooks for bottom wing and tail assembly, plus the tail wheel, can be installed.

WINGS: This phase of construction should offer no challenge. If wider stock is available, ignore the splice lines. We cemented the ribs in place by applying cement to the back third of each rib. When dry, cement was applied to the rest of each rib, the wing turned right side up and pinned down. The bottom of the lower wing center section is sheet covered. Dihedral breaks are reinforced with gauze or silk strips.

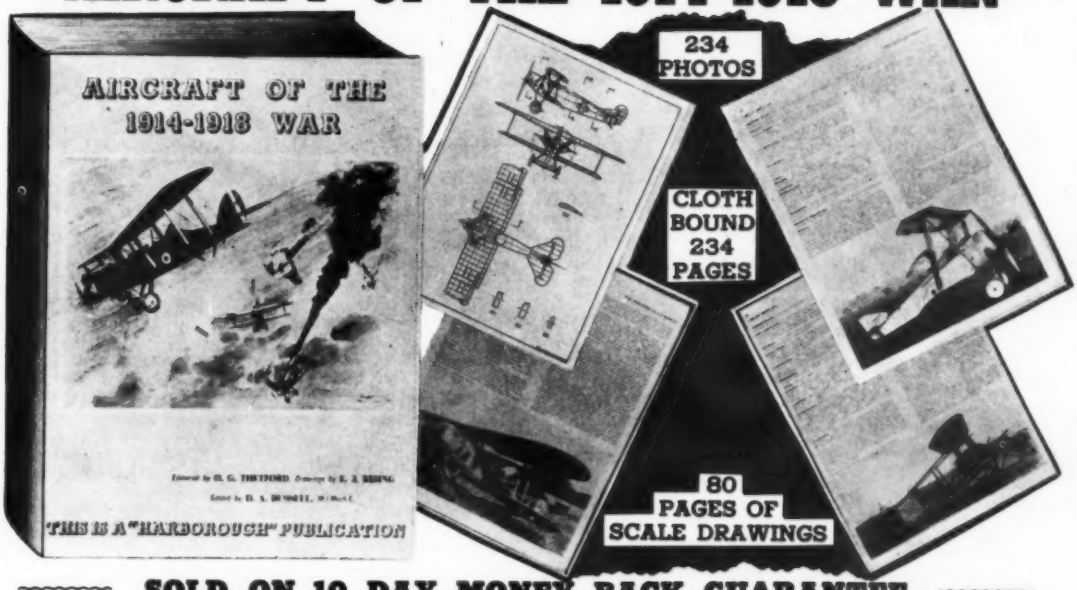
STABILIZER, FIN, RUDDER: Like the wings, these, too, offer no problem. They are built around a light framework, not because they need to be extra strong, but because, one; extra weight was needed to balance the model without employing sinkers, BB's, and an old rim wrench, and, two; this type of construction is not as subject to warps as might have been encountered had we used a single layer of thicker material with comparable weight. The fin center filler is extended to fit into the slot in the stabilizer for added strength. Soft wire, or very thin aluminum, is installed as a hinge for the rudder to trim "Snoopy" for flight.

FINISH: Sand the entire framework with very fine sandpaper. Apply two coats of VERY thin dope and allow ample drying time between each. We specify VERY thin dope, contrary to the thinking of some, because it will penetrate farther into the wood, giving a better base for later coats and also adds tremendously to the strength of the wood. It is important that the primary coats of dope for the wings be VERY light also, and applied to the UNDERSIDE of the wings first. Then applied to the top. This will minimize the chances for warps. When the first two coats are completely dry, sand with very fine sandpaper. Apply two more coats of clear dope of normal consistency, sanding between each coat (when thoroughly dry) with No. 400 wet-or-dry paper, dry. The final trim is up to the individual and we will excuse any FF contestants who might want to keep weight down with a little experimenting of their own. We usually top off the finish process with a coat of fuel-proofer, even if we have fuel-proof dope, just for gloss.

FLIGHT TRIM: There is little left to say, regarding steps preparatory to actual flight. However, (here comes the commercial) a few things might be noted. Be absolutely certain that the wings and stabilizer are exactly at the angles shown on the plans. This will govern the glide. Power-on flight trim can be accomplished later. If you trim the flying surfaces to accommodate the engine thrust, power-on might be smooth, but the glide will suffer and may cause the plane either to dive or stall to a crashing conclusion. Make certain the glide path is flat and it will be rather slow. In trimming shift weight

(*Continued on page* 40)

"AIRCRAFT OF THE 1914-1918 WAR"



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CONTENTS: Eighty aircraft flown by nations in the 1914 - 18 War are each described with a large photograph and full set of 1 72" scale three-view drawings. Wing and fuselage sections given. Complete dimensions, weight, armament, performance and power plant are given for each. "Operational History" of each plane is told in great detail. These Photos and Drawings are a must for all solid model and scale model builders.

IN ADDITION: a further 24 Aircraft are described with large photo, complete dimensions, weight, armament, etc. As with the first 80 Aircraft, full information is given as to the squadrons that these planes were issued. Yet another 94 more British, German, and French are shown of the "Experimental" and "Rare" types.

PLANS: The plans are all drawn to same 1/72" scale be they Bomber or Fighter type. Fighter type cover full page, the Bombers being larger are drawn on Double size pages that fold out from the book approximately 9"x 20" These are a must for all scale builders. Every conceivable plan is given; Spads, Fokkers, Nieuports, B E 2 C, Bleriot, Rumpler Taube, Curtis Jenny, these are just a few.

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around the marked center of gravity. It is best to have Snoopy just the least bit tail heavy on the first glide. This design has a decided preference to mush, rather than stall, if a little tail heavy or, if in gliding, the launching speed does not quite approximate the actual flying speed. Be certain to have the prop and spinner on while testing (we haven't broken a prop yet in faulty test glides) for their weight enters into the over all balance picture. Shifting the top wing back and forth should correct any previous erratic behavior. If a motor of the type we use is employed, effect about three or four degrees right thrust for the initial flights, decreasing the off-set, in proportion, as the relative engine power is decreased. If you have any qualms put the prop on backwards for the first few flights.

We hope you enjoy Snoopy. It's a rugged little rascal.

What Goes Up

(*Continued from page* 18)

armature must never touch the magnetic core piece—the air gap between the two should be at least the thickness of bond paper when pulled in. Use the second or dead contact to preserve that adjustment.

On the 4F, the slotted screw head on the spiral spring lowers the pull-in when turned to the left (just a hair!); the lower contact (the active one in this installation) adjusts the gap between pull-in and drop-out. Screw the contact out and the gap widens and vice versa. But also, as this contact screws out, the pull-in value may increase. If much of adjustment is made by this means, it may become necessary to readjust spring tension. Do learn to adjust the relay and remember that dollar bill trick.

ESCAPEMENT: A Babcock Mark 2 is shown on rudder—the Bonner SN auxiliary works an air bleed two-speed system. You don't have to use motor control. The Babcock is a compound escapement: that is, it can be used to operate a second actuator as well. The Bonner compound has the same function. The compound actuators are better for beginners, and for flying at extreme distances, because holding a single impulse at the transmitter always gives a turn in the one direction—usually to the right. You know which way the model turned. There is no sequence to remember. The Bonner compound may require an aerodynamically balanced rudder to prevent the airstream from pushing the rudder back toward neutral, on a faster, bigger, or heavier ship. It is a good idea, regardless, to balance the rudder. That is, have up to 20% of its area ahead of the hinge line and in such manner that the balanced portion can jut out into the air stream beyond the side of the fin. For use with either 3/16 or ¼ inch rubber, the Mark 2 used ¼ inch in this installation. Plenty of muscle and about 225 operations on a flight—if needed. With low contact pressure on the relay, a servo actuator is handicapped.

BATTERIES: Why use small batteries when you can use big ones, save money, and have more flights. Hence the .19 plane! B battery is a Burgess K-45—no hearing aids! Though the receiver can operate on hearing aids, plus a couple of pencells for A supply, we first used one Burgess photo-flash battery (same size as C flashlight battery) for the A supply and two more for escapement. In fact, the stabilizer was trimmed so that we could fly later with double this amount, or six batteries. Crazy? Wonderful! Voltage never seems to drop. The batteries were taped to-

gether and #24 stranded wire leads wound into a cable. Receiver and battery pack cables plug into side-by-side sockets in the middle of the cabin, as seen in the picture.

MISCELLANEOUS: On very long flights an interference effect was built up by the mid point of the flight. The writer has witnessed this before, especially on hard-tube receivers of this type, the Miller, etc. A light stranded bonding wire was soldered to the front end of the metal torque rod that moves the rudder and to the frame contact on the Mark 2. Also, a piece of insulation wire covering was slipped over the linkage end at the rear where it passed up through the yoke on the rudder. The trouble vanished. More bonding should be done in RC. Rattling linkage can cause interference even with a wood torque rod.

A pushbutton switch on the cabin side triggers the auxiliary escapement to change motor speed without having to use the radio for testing. This switch permits reading escapement battery voltage under load at the escapement—just by pushing the switch. Cabin top edges were covered with 3/8 inch thick rubber-and-felt weather stripping, attached with Pliobond. This eliminates wing shifting, keeps out dirty exhaust fumes. Two straight ahead dowels through the windshield—also wood by the way—allowed the wing to pop off without tearing out the dowel and pieces of the cabin bulkhead in a crash.

Landing gear has rubber shock feature, plus a spreader bar well up on the struts, and is not apt to bend.

TRANSMITTER: The one shown happens to be Lorenz MOPA from Essco. All the "junk" is simply a two-volt wet cell battery, a power pack, and a trickle charger. Such a transmitter probably costs $20 more but the elimination of batteries gets that back in two years. A previous transmitter is this same case had slightly more output but would not send a good signal when the ground was really dried out in later summer. If you use batteries check them under load. Maintain the load for at least 15 seconds to see if the voltage fades steadily. If it does, the batteries probably are weak. Hand held units are not as subject to tuning changes as are the stationery types, some more than others, so check transmitter tuning when you change method of operation, as from car top to ground.

FIELD STRENGTH METER: You might do without one, but the meter is the only way you'll be sure what your transmitter is doing. After some near out-of-sight flights, with spotty control but happy endings (they came back), it was discovered that the transmitter was detuned from indoor testing and was developing only one-third normal output!

KEYING LEADS: We fly this airplane with a spare keying lead nearby. Switches and leads eventually quit—happend three times to us through the years. At first sign of trouble switch leads.

Pictures show ground check procedure. Some modelers boast that ground checks are not required. But sooner or later a ground check will pin point something like a bad transmitter tube just about to give up the ghost. Or your drop on signal at a known distance isn't what it should be. Actually, the weakest signal works at a surprising distance so you might get away without regular ground checks. But some adjustment is right on the edge and when it goes! This receiver drops to .4 to .5 at 300 to 500 feet on the ground. depending on sensitivity adjustment and the transmitter. If it won't, and it is tuned, your transmitter is suspect.

Fairchild Guppy

(*Continued from page* 28)

results; by all means we encourage it. The model can be used for surface running if so desired, in this case, remove or disengage the control for diving sequence.

With experience we conclude that the sub should not be submerged beyond 6 inches of the top of the antenna. A safety precaution more than anything else. Another point is that the motor driving the screw will run until shut off by removing the hatch.

At this point we would like to wish good luck to the builders and have them think of the possibilities of launching two torpedos from amidships. WOW!

Test "flying" is a bit different from sending off a new model airplane. First, as we said, the sub must be properly ballasted, about like a water logged piece of wood. If you shove the sub forward it will go under the surface slightly and resurface about eight to ten feet away.

First step is to check for directional stability and control. When the motor is started, hatch in place, the sub is allowed to run without radio control back and forth across a pond. A helper can turn it around for you. If the sub tends to turn or roll, the controls are bent slightly as necessary to make adjustments. The sub is fast so use a high-pitch propeller.

Second, with radio in play, check runs for control. Control adjustments may be necessary for more or less turn, etc. When the vessel can be steered about properly, it is time to check the diving control and length of time required for submersion and recovery. Give the elevators a brief application of down, then return the controls immediately to neutral. The sub should stay under water, then resurface within a few seconds, perhaps eight feet away. How long the sub remains under depends on the speed of the sub and the length of time down control was held. Although it is suggested that the sub not be submerged so that less than 6 inches antenna remains above the surface, we once had only three inches showing. Response was faulty and a real panic ensued. However, being buoyant, the sub will always resurface if the controls are neutralized. For beginners, a length of twine can be attached to a screw eye in the bow.

The combinations of the elevator and rudder cams are too numerous to admit description. This is strictly a trial and error business, up to the individual. My sub turns left when it dives and right when it resurfaces. It is possible to steer under water, go straight under water and so on, and on, by varying the relation of the cams to each other. We suggest that the builder ponder what control actions he wants and set the cams accordingly.

Engine Review

(*Continued from page* 7)

pherical combustion chamber instead of a flattened hemisphere. The change from a cast to a forged conrod was made some time ago owing to a rash of thunderheads, and Hi Johnson will trade new for old free of charge.

The crankcase casting is notable in several ways, having a cast-in sintered meehanite main-bearing bushing, a long tapered intake bore that is machine finished, and radial mounting lugs that are designed for the job, as distinct from being backplate retaining lugs suggested for mounting as an afterthought. There is room on the forward side for locknuts, and the lug thickness is concrete proof.

(*Continued on page* 44)

In engines having a large bypass passage and a relatively thin drop-in, or pressed-in cylinder liner, there is a considerable part of the liner unsupported by the main casting at a point where the piston side load is at its maximum. Since the liner is considerably weakened by the ports, it is possible for the lower part of the liner to distort so that the top and bottom edges of the ports are not in line. The piston, therefore, has to pass over a slight step which causes it to tilt and wear excessively. This is a common cause of lost compression and is minimized in the Johnson by a narrow rib passing down the middle of the bypass passage, which is finished by the boring tool and, consequently, fits and supports the liner. Another common imperfection in engines of this general layout is that the bypass preserves its cross section all the way to the top of the casting, and terminates at the cylinder flange point. The position of the cylinder flange is dictated by the exhaust port, which, being higher than the bypass port, results in the passage extending beyond the port and forming a pocket which impedes the flow of charge around the corner into the cylinder. In the Johnson, this pocket is replaced by metal and the charge has a smooth path through the port. The complication and expenses added to the crankcase die by this small detail is considerable.

It is easy to dismiss the old primitive needle valve as being the same the whole world over, but it is quite remarkable how many different variations can be found on model engines. The Johnson has one which, while being excellent in operation, is the simplest to produce of any we have seen among the removable types. The spraybar hole in the intake is drilled straight through with a tapping size drill, and one side only is tapped. The spraybar is threaded for slightly less than half its length, and the rest is turned to fit the tapping hole in the other side of the intake. Thus, the spraybar is slipped through the tapped hole, then screwed in until the threads are just visible in the intake bore, a locknut tightened up, and there you have it. The needle hole is parallel, but the needle is such a good fit that a positive shut-off is achieved. The only objection to the idea is the absence of fuel-line pressure rings, and the fact that the assembly is not reversible.

Apart from being a very well finished part in every respect, the cylinder liner is fairly conventional. The wall thickness above the lower flange is unusual in that it is thicker than that below the flange, despite the extra rigidity at the top provided by the cooling fins. The lower flange is very substantial and seats on the main casting with no joint gasket. This, providing that the faces are flat and well finished, has three advantages. The port timing does not vary with bolt tightness and gasket compression, the flow of heat through the joint is not impeded, which may have advantages, and differential expansion between cylinder and hold-down bolts is absorbed by the head gasket, again with no effect on port timing. The port heights are normal for an engine with square bore and stroke, but the exhaust port is not as long at it could be and covers about 120 degrees of the bore. The exhaust duct in the main casting will accommodate a larger port and one can only conclude that cylinder stiffness proved more advantageous than a free exhaust.

The piston is unique in having a domed crown with a straight shallow baffle. This is accomplished by using a sintered iron moulding with properly formed wrist pin supports, and a uniform wall thickness everywhere else. The result is a light stress free piston on a highly suitable material

that must be a useful advance over the type machined from bar. The domed crown, which would be difficult to produce by any other method, enables the baffle height to be less than usual and thus be accommodated in a much improved shape of combustion chamber. With a vertical central plug and deep cooling fins the head is conventional, but has plenty of room around the plug for an open-ended wrench when, as usual, you left the socket back home on the bench.

The crankshaft has sturdy dimensions with a 7/16" diameter mainshaft, 5/16" port and gas passage, and a ¼" crankpin. The center drilling extends right through to the prop drive shoulder and communicates with small countersunk oil holes at the most heavily loaded positions at each end of the shaft. The drive is conveyed by a substantial flat and shoulder, to a large diameter die cast prop driver with retention by a steel nut and washer on a ¼ thread. A very heavy counterweight of the crescent type offsets the drilled crankpin and rotating mass of the rod, and is given rotational clearance by the provision of a conrod with an offset shank.

The general quality of finish and machining throughout this engine is of a very high order and several unique features are embodied in its design. Both .32 and .35 versions with identical mounting dimensions are also available.

Operation and Handling

There is little one can say about the behavior of this engine that has not already been said about a dozen others. Present day engines of similar types have reached such a high standard of reliability and similarity in the starting department that one can only observe that one is better or worse than the average. The Johnson behaves absolutely normally and can be started quite readily without a prime. With one she goes first time. In performance there is an extra amount of torque around 12,000 RPM which may come from the piston design, and the exhaust was cleaner than usual for the type. The needle response is good but a shade less progressive than that of some .29 engines. However, once set it holds a constant power setting very well and the fuel tank can be moved further up and down than is usual for the size of intake. At some speeds, the freedom from vibration is outstanding but there is a period at around 10,000 RPM which may be amplified in a model. As it is outside the normal operating speed of the engine, it will not be noticed in most applications, and may not be present in the latest version which has a modified counterweight.

Test.

Fuel: Supersonic 1000
Plug: Spitfire ¼-32 Short Reach as supplied.
Running Time prior to test: ¾ hour.
Bore: .718 Stroke: .718 Weight: 6¾ oz.

Power Prop.	*RPM*
10 x 8	11,100
10 x 6	12,000
9 x 8	12,300
9 x 6	13,400
8 x 8	13,500
8 x 6	14,100
7 x 10½	13,450
7 x 9	13,800
7 x 8	14,100
Top Flite	*RPM*
10 x 8	10,200
10 x 6	11,200
9 x 8	11,350
9 x 6	12,200
8 x 8	12,450
8 x 6	13,100

(Later model peaks 700 RPM higher.)

How to Test a Stunt Ship

(*Continued from page* 11)

weight: Model will have light tug, and tend to get lighter on sharp pullouts, both upright and inverted. Too much weight will cause just the opposite, including tendency to drop outboard wing in a glide. Not off, just sag a little. Proper weight will keep wings level through all maneuvers.

If your model balanced properly and retrimming did not correct sluggishness, or unusually sensitive response, your controls are probably to blame. Insufficient response would then mean not enough motion of control surfaces. An illustration shows points where control sensitivity can be adjusted. Roughly works this way. Increase of dimensions 1, 2 or 6 will increase ratio of elevator to handle movement. Decrease of 4 or 5 holding others constant will increase motion. Generally 1 and 3 are fixed and 2 is inaccessible, so the easiest place is 4. Assuming no flaps for present, sluggishness may be corrected by moving hole in elevator horn closer to elevator. If you've already got 45° up and down, forget it. You need a bigger elevator. A flat plate will generate its maximum lift at 45°. Any increase in angle will increase the drag but decrease the lift. Therefore, if 45° doesn't do the job, it must be made larger. Many fliers don't seem to realize this fact. My own preference is a 4 inch spacing at handle, a 3 inch bellcrank using the center hole for pushrod, and a ¾ inch horn. This gives me roughly same elevator motion as hand motion. With the CG located just forward of quarter-chord, 30° elevator motion is usually sufficient.

In general, the farther forward the landing gear is placed the harder it will be to raise the tail for take off and landings will be tougher. Ideal location allows full control of take off and landing attitudes. Too far aft will naturally nose you over on landings and perhaps take offs.

If line tension is too light and warps and wing weight are not to blame, easiest correction is more engine offset. Rudder offset has little effect on tug, believe it or not. There are other ways which will be covered.

The vertical location of the tank is extremely important to the stunt model. Assuming you have a good commercial tank or one of sound design, errors in location will show up as follows: If center line of tank is higher than the center line of the needle valve, even 1/16 inch engine will richen up during inside loops and other upright maneuvers. Engine will get lean inverted and leaner on outside maneuvers. This is due to fact that in a loop, up to 20g's of centrifugal force may be built up. This increases or decreases the pressure head of the fuel in the tank causing it to flow faster or slower. Vents may also affect this condition. The Darwin or similar tanks using 2 vents should have pieces of fuel line with one end cut off at a 45° angle, slipped over vent tubes. Face open end of tube forward to prevent syphoning during flight. Most modern stunt engines have adequate fuel suction, at least 15 inches, so troubles with fuel flow will usually be the tank or dirt.

To summarize briefly, we've found several symptoms which may have separate causes. For instance, nose heaviness, and insufficient control motion look somewhat the same, but there are subtle differences which can be recognized. There are some key maneuvers which will isolate trouble. With experience it is possible to completely analyze a ship in one flight.

Our pet procedure goes something like this: Peak the engine and then back the needle valve out slowly so it just runs 4 cycle. Will develop almost as much power as peaked and prevent a lean run. Take off is made with neutral or slight up elevator. Rate of climb is observed to check trim. The ship is gradually worked to the top to check tug and warps. If it doesn't get too light we try a sharp climb. A warp or light tip weight will show up quickly here. A sharp pullout is next for same reason. Run through a few inside loops and see how she turns and how easily it responds to minor motions of handle. If nothing shows up yet we lay it over on its back and run through the same procedure. Following this come the square loop and as many of the eights as we have fuel for. And finally the glide, approach and landing get close observation for trim and balance. By working through this sequence of maneuvers you can do a full pattern first flight, IF, she checks out on each stage. Don't, however, try sharp pull ups, etc., if she's riding light or if she looks tail heavy. We were also listening to the engine and making sure tank and needle valve settings were right.

With original designs the problems are multiplied. What looks like nose-heavy trim might be insufficient wing area, too little elevator area or motion, or wrong angular setup of wing and stab. Any number of things can go sour with a dream ship. About the best advice is to try to analyze what it should do and see if it does it.

See you next month.

Radio Control News

(*Continued from page* 31)

west coast, the LARKS (Los Angeles), may put some more spice into RC flying if Colby Evett has his way. Colby has suggested endurance flying to be set up in the following manner. Flights must ROG and landings must be within 200 paces of takeoff. Each month it will be possible for someone else to take home the trophy, providing he has beat the previous high time by at least 5%. If a member approaches the world duration record, the club will make the necessary arrangements for a try at the record. Now we're getting someplace.

This next item could be a mistake but it appears from our copy of the report that Bob Chase made a duration flight with an RC glider at Torrey Pines, the site of full-scale sailplane operation. He had to come down since it was getting dark. Oh yes, the time, a mere 8 hours 36 minutes.

The LARK newsletter reported a temperature of 123 degrees on the pavement at the NATS. Hope there were no wax impregnated components in the transmitters etc. Another thing we'd like to point out regarding west coast contests, is that they have an event for rudder-only, single-channel and multi-channel. How about the rest of the country: do they go for single channel flying in addition to rudder-only and multi-channel? Photos show some of the RC glider designs as used by European builders, namely Mr. Mabille of Belgium, and Mr. Huber of Switzerland, respectively. The streamlined job by Mabille has rudder and elevator control and the Swiss model is typical of the clean functional design emanating from that country. This model took second place at the International contests this past summer.

From H. Kurth of Bremen, Germany comes other photos. One shows a multi-channel 'Funkstar', one of a series of popular designs in Germany, comparable to the Live-Wire series in this country. Span

(*Continued on page* 48)

is approximately 5 feet. Another is a twin-engine semi-scale job, built by a 60-year old RC modeler. This 84" model is said to be one of the finest in Germany. Does anyone have a twin engined RC job in this country?

In view of what we have mentioned in this column before, John Worth of Hampton, Virginia advises that the Southeast Virginia Radio Control Group will promote precision RC flying in accordance with the official AMA flight pattern. We often hear of 'hot' fliers around the country, who never seem to make it when they hit a contest. Could the reason be that they just 'go out and fly' and never practice on the things that count?

Ralph N. Corelle of the RC League of North Carolina (834 Fairmont Ave., Salisbury, N.C.) tells of the contest they had at Burlington, N.C., on August 22nd. Bob Yates, using a home-designed 5-channel receiver and servo, designed by Al Meyers and himself, took first in multi-channel. Good equipment and piloting showed up when he was able to make high point landings in the face of a strong wind. Maybe it was the high wing loading that helped too. Bob Rector, Salisbury, N. C., and Dr. Hartness of Sanford, took 2nd and 3rd in multi. Henry Thaxton walked off with first place in single-channel by using a .14 powered Beam with Citizenship equipment. Austin Leftwich and Bob Lindquist, of Roanoke, Va., were 2nd and third. Leftwich, using a Rudderbug, made a cross-wind 'on the spot' landing.

The Howard Payne trophy went to Ed Hicks. Ed had the distinction of producing the best 'clobber' job of the meet. A down-elevator condition managed to wash out everything, including servos and batteries. Oh well, if you have to have a crack-up, might as well make a good one and get something for it. As in most other RC plane clubs, everyone is building a boat, just in case of bad flying weather.

The East Bay Radio Controllers, 6036 Telegraph Avenue, Oakland, Calif., publish a club newsletter under the editorship of Glenn Carter and art director, Don Zacharie. A newsworthy item from a recent sheet advises that the correct balance for ROG flights can be checked by balancing the tail at an angle of 30 degrees and allowing it to drop. At that attitude, the tail should drop first. A lot of ships we've seen could use that check. Be sure the wheels track properly.

As mentioned before, the west coast is producing some mighty fine flying and RC news reporting. Every club could have a small news sheet without undue expense. Most sheets we've seen were reproduced by th 'Ditto' process, and can be duplicated with very little effort. One or two gelatin mats can be purchased at most stationary stores, in addition to regular Ditto carbon sheets. Your supplier can furnish the simple instructions for their use. If you want to get fancy, buy a few colored Ditto pencils to fill in after the regular typing or sketching is completed. A single impression from the master sheet will produce from 50 to 100 copies, run off on inexpensive typing paper.

Looks like multi-channel flying is really here. The NATS produced 38 entries in multi-channel and 44 in rudder only.

Last minute news from Dr. A. C. Dawes of Staffs, England states that at the Annual Contests for RC Model Boats held at Bournville, Birmingham on August 6th, there was a total of nine boats being controlled at one time. This remarkable record was made possible by the use of crystal-

controlled super-het receivers. Four boats used this type of receiver, one was on 465mc and two, belonging to French contestants, were on 72mc. While being a bit larger and heavier than the conventional receiver, the crystal controlled super-het has the advantage of being extremely selective and stable. Operation is made possible by the fact that in Eugland they have a band rather than a spot frequency, in which to operate. Thanks to Dr. Dawes, Chairman of the International Radio Controlled Models Society, for this information.

TECHNICAL TOPICS

We are going to digress a bit this month and next and do a little repeating of information that has been presented before. This information will be aimed at helping the newcomer to RC to get a better picture of what he is getting into. A lot of RC builders do not realize that there are hundreds of new RC fans getting into this phase of modeling every day. A good start is half the battle and we hope that you new fans will be helped by our review.

First of all, we are dealing with radio transmission, which comes under the jurisdiction of the Federal Communications Commission (FCC). You are limited by certain rules and regulations in order to transmit a radio signal. Fortunately, the model builder has two frequencies to use for this work, namely, 27.255 and 465 mc. No license, as such, is needed to operate on these frequencies. However, a permit is required and it is of utmost importance that you obtain one from your local hobby shop, or FCC office and file it with your nearest FCC office, after properly filling it out. Many hobby shops can supply you with a form and most commercial transmitters which are sold have a form in them. Essco, 58 Walker St., and Polk's Modelcraft Hobbies, 314 Fifth Avenue, N.Y.C. will supply a form and all the needed information on FCC locations, including instructions for completing the form if you write to them and enclose a stamped self-addressed envelope. Root's Hobby Hut, 6036 Telegraph Avenue, Oakland, California, can supply western fans with the proper form.

How does a radio control unit work? Basically you need a device for generating and propagating a signal. This is the transmitter, which will send out a signal on 27.255mc or on 465mc. This signal is picked up by a device, the receiver, which converts the energy into a tangible form by means of a relay. When the receiver actuates the relay, we have in effect a switch, which can be used to close the circuit to the control device. The control device is the means by which the control surfaces or other devices are mechanically moved. Fig. 1 shows the 'chain of events' in this system. Your local hobby shop can give you more detailed information and demonstrate the operation.

How do you achieve this operation and how and where do you get the equipment? This is perhaps the most commonly asked questions, since the average builder getting into RC work is at least vaguely familiar with radio reception as found in the home and in industry. This question can be broken down into two parts, one of which will cover the building of equipment by the user and the other which entails buying commercially available equipment. For those of you who claim to have absolutely no knowledge of radio and who do not wish to build equipment, there are many many receivers, transmitters and actuators available, depending of course on just what you want to do. At present there are two AMA classes of radio control flying,

rudder-only and multi-channel, with a third class coming into use. This is known as single-channel. Rudder-only flying consists of operation of only the rudder of the plane. Multi-channel consists of actuating more than just the rudder, such as the elevators and/or engine. In multi-channel, each control action is operated by a separate relay which is in turn actuated by either several carrier (RF) or audio (AF) frequencies. Single-channel flying consists of moving more than one control, using but one relay which has been actuated by a single carrier and/or a single audio tone. Once the single relay (operated directly from the receiver) has been actuated, its contacts control devices which in turn can be used to energize other devices in the control system. Fig. 2 shows the basic differences between rudder-only, single-channel and multi-channel.

In addition to the equipment which you would either buy or build, you need power to operate the transmitter, receiver and actuators. This power generally is in the form of dry cells and/or batteries. Each radio control outfit used requires its own particular complement of batteries. Occasionally, transmitter supplies consist of vibrator power supplies, such as used in car radios. In this case, the high voltage is derived from 2- or 6-volt wet cells, after being converted to pulses, stepped up in voltage and then rectified.

As a beginner in RC work, you will hear many pros and cons as to whether you should start out with something simple, or, since it is controlled, go all the way on some super project. By all means start with something simple, using rudder only and work up from there. Do not be misled by a dealer stating that multi-channel equipment is so highly perfected that you, as a new builder, can do no wrong. The equipment may be in pretty good shape but the humans that are being built are the same as they have been for hundreds and hundreds of years. If you plan to build RC boats, you can eliminate some of the problems confronting a plane builder. If you are just starting out and want to fly RC ships, it would be wise to purchase a tried and proven design. Since many of you want to get started on something soon, the logical spot to start is with the plane or the boat, and then fit the RC gear into it. In view of this, we'll give a short resume of RC planes which would be most suited for the beginner. Next month we shall cover the equipment that is available including receivers, transmitters and actuators.

Most popular for the beginner is the Live Wire Trainer. Other popular trainers are the Beam and the Mambo. Simplicity of design and rugged construction, plus their proven flyability and contest-winning performance, put these planes at the top of the list for the beginner in rudder only RC work. If it is scale flying you wish to do, Berkeley Models produce the largest selection of scale RC planes. The Tri-Pacer by Sterling is well near the top for RC scale ships. If you want a larger ship most of the above mentioned are about 48 to 50" span), then the Live Wire Senior or Live Wire Cruiser will fill your needs. These models are excellent for either rudder-only or multi-channel work. The Berkeley Bootstraps is a model for rudder-only or single-channel work. These are but a few of the models available. Others can be built from plans and include a variety of models published in MAN. Above all, do not start on a 4-engined bomber with rudder, elevator, engine and aileron control, to say nothing of wheel brakes and movable gun turrets. Absurd? Not at all, since at least once a month a novice planning to go into

(*Continued on page 52*)

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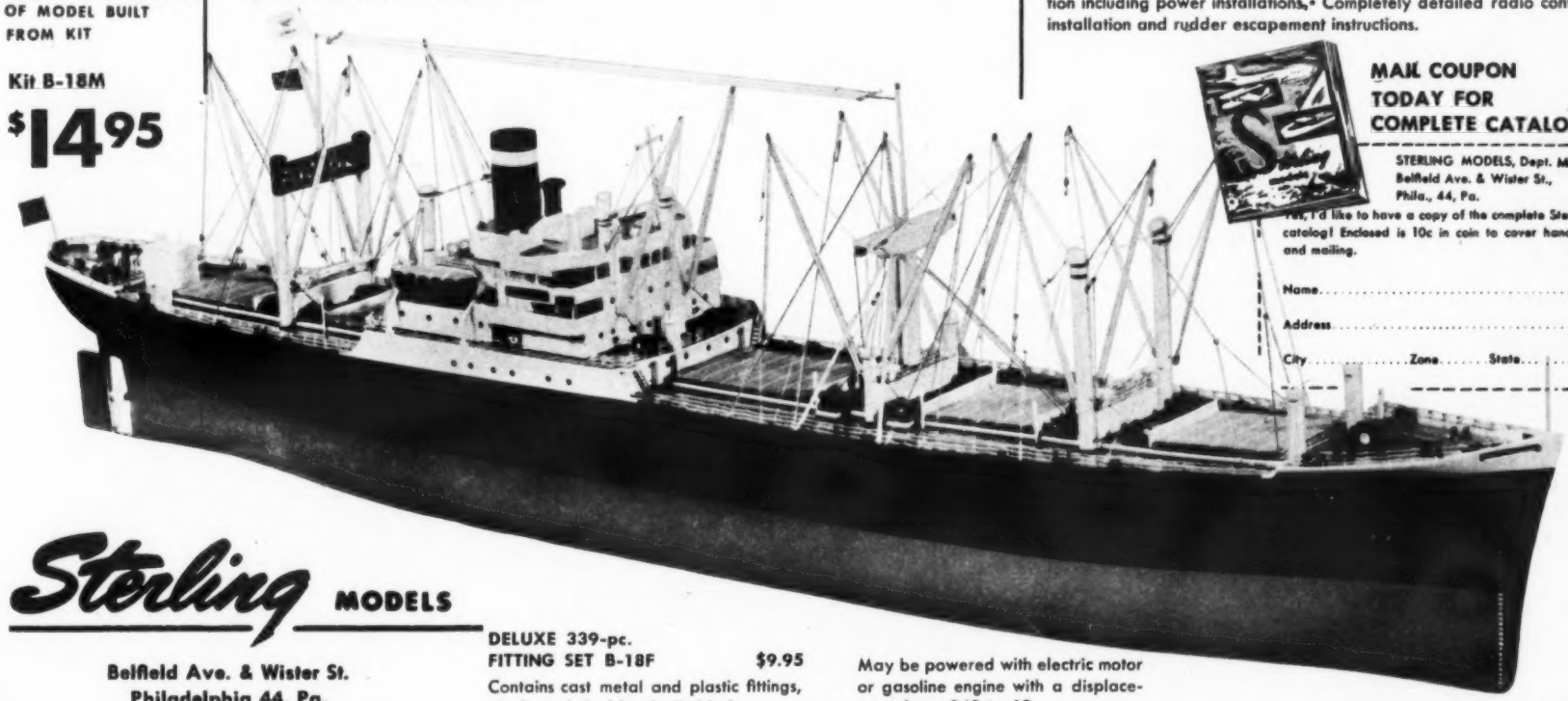

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RC works decides that this is going to be his pet project. Let's not kid ourselves, RC work is fun, relatively simple and the equipment is very reliable—but there is always the pilot. Stick with a simple proven design for rudder-only control. We'll probably hear from experienced builders and other sources to the effect that we're talking through our hat. However, 30 years of modeling has proven our theory to be correct. Would-be modelers have been started on U-control models that were so 'hot' and with such powerful engines that the first flight was the last flight, and with the flight went the modeler. Take your time in selecting your plane or boat from a reliable hobby dealer and next month we'll start on equipment.

NEW ITEMS

Now that the winter months are upon us and the mood for designing new equipment has just about hit every RC fan, we'll try to give you an idea of new items that may be of interest to you. From Lafayette Radio, 100 Sixth Avenue, N.Y.C., we have the following items: Prepunched phenolic paper base stock, which makes for easier layout work on new circuits. The holes are punched on a 3/16" grid and will accommodate flea clips or small evelets. All boards are 1/16" thick and the 3¼" x 3¾" sells for 25 cents, the 3¾" x 6¾" for 40 cents, and the 6¾" x 7½" for 75 cents. These boards are just the thing for laying out a circuit prior to converting to printed wiring and for building a receiver or transmitter in minimum time. Also from Lafayette, their new JEWEL relay. This compact relay, measuraing about ¾" x ½" x 1 1/16" and weighing ½ ounce sells for $2.75. At present it is available only in the 5000 ohm coil.

If you're out looking for a boat that is radio controlled, take a look at the Cheryl Ann, which is distributed by Polk's Modelcraft Hobbies, New York. N.Y. This popular model comes complete with all radio gear, actuators, ready built transmitter and ALL batteries needed for operation. Just snap in the batteries and start operations. $89.50 buys this remarkable outfit, the same unit used by Disneyland. We've mentioned this unit before but thought that a few newcomers to RC would be interested in it since it is enjoying a high degree of popularity. Polk's also is offering for $25.00, for a limited time only, a North American twin-tube receiver, with tubes and relay, plus the North American transmitter utilizing a built-in miniature meter. This is brand new high quality equipment which we highly recommend for boat use, the transmitter being the limiting factor for long-range flying. This is the printed wiring receiver which made the two-tuber popular.

Broadfield Air-Models, Ashland, Mass. manufactures the 'Grooved for Gussets' leading and trailing edges. These 36" lengths come in a variety of cross section sizes and are priced from 20 to 35 cents per pair. As the name implies, there is a 1/16" x ¼" groove running lengthwise on the inside of the leading or trailing edge which allows the gusset to be held firmly in place while the cement is drying. Speed of construction and a more rugged assembly are assured when using these strips.

Since the '56 NATS multi-channel RC event was won by a 5-channel CG Electronics Corp unit, we expect to see an upswing in reed equipment. CG, Bramco Badaco and Schmidt equipment seem to lead the reed field. with many other units also available. Audio stability is the big improvement in this area, plus the experience in tuning the equipment.

Babcock Models Inc., Box 3134, Van Nuys, Calif., has a new RC relay on the market which looks like it will be as popular as other Babcock equipment. Weighing but ⅞ ounce and with coil resistances up to 5000 ohms, it will operate on as low as 10 milliwatts of power. Points are adjustable, the contacts being of ⅜" diameter coin silver, with 3/16" diameter points also avaiable. You can't go wrong on this unit for $4.95.

As we mentioned in Club News, the Mirror Meet this year was won by Dick Allen with the Robot I receiver and transmitter (rudder only). This equipment is very well constructed and neatly packaged, with a built-in meter in the transmitter. The receiver employs sub-minature tubes and operates from a tone signal. A Sigma 26F relay is standard with the receiver. Relay current drops from 4ma with no signal to 1ma with signal. A single tuning control, coupled with stable operation over a wide range of battery voltages, make this an extremely reliable receiver. With built-in arc suppression for the relay contacts, the receiver sells for $29.95. The $39.95 transmitter is 100% modulated and the oscillator is unaffected by antenna loading. This company also plans to market their Robot Synchro shortly. The Robot Synchro is a completely different type of actuator, giving absolute proportional control with no flapping surfaces and positive power great enough to handle any type of control surface or device. Battery drain is well below that of most actuators and the device is self compensating for lowered battery voltages.

Several really 'hot' items came in at the last minute this month and we hardly know which one to present first, since they all are unique in their own way. A photo shows the new Deltron 99 transmitter, utilizing a printed circuit and a radiation indicator. This $21.95 transmitter is ready built and factory tested. Also available for only 75 cents, is the Deltron whip antenna, made of plated 3/32" music wire with a colored static ball afixed to one end. This antenna will fit other commercial transmitters. Perhaps the biggest news from Deltron is their Lifetime Guarantee Policy which goes so far as to replace a set (receiver) which has been completely washed out due to a crash, for ½ price. Skilled repair service will take handle repairs and adjustments at a nominal charge, often at a charge which does not even cover the cost of postage and handling. This of course applies only to Deltron equipment.

B & S Products, Box 135, Mercer Island, Wash. has done it again. MAN was the first to feature and describe the new type of receiver power supply developed and marketed by this company. This transistorized power converter allows the user to obtain from 22½ to 67½ volts of B voltage from but 3 or 4 pencells. Various units are available ranging from the 22½ and 45 volt combination to the 30 volt unit and finally to the new 67½v model. Since we described the operation and features of the earlier models in previous issues, we'll merely fill you in on the new 67½v model. Incidentally, some of the largest commercial firms have ordered these units for various uses. A recent shipment went all the way to Thailand. This new 67½v model uses 4 transistors and higher quality diodes, in addition to a new transformer. The size is but 1 5/16" x 2½" x ¾" and the weight a mere 1 ounce. Power is derived from 4 pencells (6v) and the current drain is 40ma with no load. The converter is capable of supply up to 8ma of current. The

unit which we tested had very good regularity and in this respect it compared to batteries about ½ way through their life. So far this unit has been checked on Citizenship equipment, various hard- and gas-tube receivers, Badaco single-channel receiver, and next month we'll let you know how it stacks up for use with Babcock single- and multi-channel and reed equipment.

The last but not least item is the TIPPY receiver, marketed by the Wilshire Model Center, 1326 Wilshire Blvd., Santa Monica, Calif. This twin hard tube German designed receiver uses 3S4 tubes and measures 1 3/8" x 1¾" x 3", weighing about 2 ounces. The TIPPY is an economy version of the famous Graupner unit described in an earlier column. The main features we found in testing this unit is the reliability using but 30 volts on the plate, although it will work with plate voltages as high as 60 volts. Since no relay is supplied, any relay of from 500 to 10,000 ohms may be used. This is the most sensitive twin-tube hard-tube receiver we have tested. The filaments of the 3S4's are connected in parallel, thus giving a total drain of 200ma for the filaments. We used only ½ of the relay tube filament and operation was unimpared. This would cut the drain to 150 ma. The relay current is zero with no signal, rising to about 4ma with signal. The first stage idles about .6ma.

Sea Gull

(*Continued from page* 23)

each wing half is built up flat on the building board, and to facilitate construction the underside of the ribs between the spars is flat, enabling the builder to pin the ribs down directly over the plan in their appropriate positions.

Commence construction of the wings by slotting the ¾" x 3/16" commercial trailing edge member to accommodate the 1/16" sheet ribs. Pin down the trailing edge with packing pieces underneath, as illustrated on the drawing. These packing pieces are 1" lengths of trailing edge section, similar to that used on the wing, spaced about two inches apart, but fitted with the thin end forward. Cement the wing ribs in position with pins either side to keep them vertical during assembly, insuring that the ribs with the narrow spar slots (1/16") are confined to the four inboard positions. Next add the ⅜" sq. leading edge. Spars are 5/16" deep cut from 1/16" sheet (hard) and the outboard (i.e. sweptback) portions should be slid through ribs first and cemented in place, working in from the wing tip. The inboard spars can now be pushed through from root end of the wing and can be cut at an angle to pick up with the outer wing spars. Note that at the root of each wing half the leading and trailing edges finish flush with the root rib while the spars extend ¾" beyond the rib to the center line of the model. All the wing gussets are cut from 1/16" sheet and can now be fitted along with the ¾" x 1/16" diagonal braces which fit between the spars and maintain the wing at the correct sweepback after covering and doping. On no account should any attempt be made to lighten the wings by omitting these diagonals. When completely set, wing may be removed from board.

Before the two half-wings can be joined together, it is first necessary to make two further slots 1/16" x 5/16" deep in the root, ribs, one at the forward face of the front spar and the other at the aft face of the rear spar. These slots are made to house the two main joint strips 1/16" x 5/16" x 3½" long, as indicated on the drawing. Next, two blocks should be prepared ready to support the wing tips at 1" dihedral. Coat the forward face of the front spars and the aft face of the rear spars with cement, between the root rib and the rib next to it. Slide the joint spars into position so that the protruding main spars butt together. Quickly place the wings down on the building board over the portion of the drawing describing the method of joining the wings. Put the dihedral blocks under each tip, then cement the short spar joint strips (1/16" x 5/16" x 13/16" long) on the aft face of the front spars and the forward face of the rear spars. Check that the dihedral is 1" at the tip and that the two wing halves are correctly alined and directly opposite each other. Pins may be pushed through the root ribs to hold the two components in position while the cement hardens. Next, add the short lengths of leading and trailing edges across the center section. Complete by fitting the 1/16" sheet gussets. Allow to dry for at least three hours before removing from the board.

Tissue cover the underside of the wings first, but do NOT cement the tissue to the underside of each rib. If the size of the tissue sheet permits, the undersurface may be covered in one piece. Alternatively cover underside of each half wing and then the narrow center strip. The upper surface

(*Continued on page* 56)

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MUST be covered in three pieces, and it will also be necessary to cement the tissue to *each rib between the rear spar and the trailing edge*, due to the reflex section of the aerofoil, coupled with the large sweepback.

When covering is complete, water shrink the undersurface only. Allow to dry naturally then apply one coat of clear dope. When dry, carefully hold down one side of the wing on the board by means of weights or pins, then water shrink this half only. When dry give one coat of clear dope. Repeat procedure for other side of wing. This method will eliminate warps due to dope tightening the tissue covering.

ELEVONS: These are cut from 1/16" sheet to the shape given, and then sanded to the appropriate section. Cut thin metal strips from aluminum or tin to form stiff hinges and cement these in their respective places on the control surfaces and leave to set. When dry, cement the other side of strips to wing trailing edges. Finally, cement the fins in position on the tip ribs, taking care that both fins are in the same relative attitude.

ASSEMBLY and FLYING: Fasten the wings on the fuselage with rubber bands and then add lead shot or other suitable weights in the nose until the model balances at the point indicated on the plan. The actual center of gravity position is not extremely critical to ¼" each side of the point shown, but the author advises that the model be balanced as detailed on the drawing for initial flights. When experience has been gained with this type of ship, it will be found that in calm weather the Seagull can be trimmed to fly perfectly with its C.G. 3/8" aft of the position given.

Check that the angle of the elevons agrees with that illustrated on the plan. Primary test glides should, naturally, be carried out in calm conditions and any tendency the model may have to turn one way or the other should be countered by slightly raising the starboard elevon in the case of a left turn (viewed from the rear), or by raising the port elevon slightly in the event of the ship turning to the right. Fore and aft trim is corrected by raising BOTH elevons a little if the ship dives, or by lowering the elevons slightly if the model tends to stall. Remember that a tail-less model glides faster than a conventional machine and that although hand launching helps to give some indication of the trim, true flight characteristics cannot be assessed until the ship is tow launched to about 50 feet and allowed to settle in its own natural glide. When the trim appears satisfactory, tow or winch launch to about 50 feet, allowing the ship to cast off while in a horizontal attitude. No attempt should be made to jerk the model off the line as this most certainly will set up a series of stalls. After casting off, observe the flight path and correct any faults as indicated above. Finally, put your name and address on the ship.

Foreign Notes

(*Continued from page* 35)

of all Canadian, British and American readers—none of whom really regard the others as "foreign"—and ask you not to take our "Foreign" Notes title too literally. Our excuses offered, we takes this opportunity to include a few remarks from Val Ure of Saskatoon, Saskatchewan.

Commenting on the "new" FAI power rules (now, of course, withdrawn, pending further discussion) Val tells us that he has been flying models to this formula ever since the rules were published. "All I did was to put a Thermal Hopper in my Mac .09 job and, presto, its first flight was its last: over the hill and far away. Also installed my Mac .09 Diesel in my K&B .15 job and added a little ballast to bring it up to the required minimum and made the best time in a contest with it." Val, a former Wakefield team member, is a low-wing friend. These free-flights are both low-wing: somewhat reminiscent of Sadler's Pacemaker design, he says. He even has a low-wing new rule Wakefield. (In case you've forgotten, a low-wing did once win the Wakefield; in 1929.)

Finland

Jamijarvi, site of former Wakefield Championship finals, was the scene of the 1956 Nordic States international event for free-flight power, glider and rubber. In the power class (FAI rules), Hans Friis (Sweden) topped the results with 14:49. In the glider event (Nordic A2 rules) Sweden also topped the list, Gunnar Kalen recording 12:23. Erik Knudsen of Denmark (since placed third in the World Championship) won the Wakefield rubber class with the only maximum score of 15:00. On team basis, Sweden placed first, followed by Finland and Norway.

Britain

Outside the U.S., butyrate base dopes are practically unknown. This may astonish the average American modeler, to whom separate fuel proofing may now seem to be as out of date as the Model T. but there has not been a very big demand for fuelproof dopes due to the wide use of Diesels, the most common fuels for which do not affect ordinary nitrate dopes. However, this deficiency has now been rectified by the introduction of a new British dope known as "A.F.P." which is said to be an advance on popular brands of butyrate fuelproof dopes. In addition to being completely immune to all known fuels and additives, it provides a better finish.

Russia

In placing 2nd. in the Team Championship, ahead of Great Britain and the U.S., Russia's performance in the Wakefield was undoubtedly a surprise to many. This was, of course, the Russians' very first entry in

(*Continued on page* 58)

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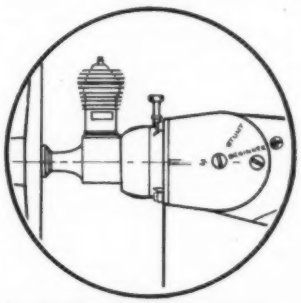

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Australia

We hear that well-known Melbourne model builder Tony Farnon is to attempt to set up a new jet model record. Model is a modified Berkeley Squirt and is powered by an O.S. Type II pulse-jet.

Italy

New .15 glow motor is Barbini B.40 Glo. Is based on established B.40 Diesel, but has ball-bearing shaft. Unpretentious exterior, but well made inside.

Germany

Latest entry into the RC market is Radio-RIM of Munich, old established radio-hobbyists' stores. Receiver, called Miniking I is a tone outfit of unique design. Further details to follow in this column.

Britain

Frog 249 (.15 cu. in.) twin-ball bearing Diesels now being supplied through U.S. importer John Maloney are specially hopped-up version of standard model with modified porting. Modified engines are at present exclusive to the U.S. market and are not available in England.

The Aero Bat

(*Continued from page* 14)

lage to keep the nose straight, then cement the tail end together. After the fuselage has dried in this manner, cement it to the wing and cement the stabilizer in place. The landing gear should be put in place next with adequate bracing to absorb landing shock. The rounded turtle deck is strip planked and the top and bottom are cemented on after the tank (A Froom C in mine) is secured within the fuselage. The cockpit can be easily made out of a sheet of light celluloid, bent to conform to the turtle deck and the fuselage.

Cover the wings, sand the plane, and cement on the rudder, then paint. I used heavy-weight Silkspan, with two coats of aircraft Butyrate (not thinned), five coats of black Aero Gloss and then three coats of each trim color. I allowed about 24 hours between coats on the clear and at least two between coats on the black. I have found that if the masking tape is removed before the trim paint is set up, that I can get a smoother edge without losing clean-cut lines.

The cowl is optional and is of a very simple type, a one-half inch thick piece of balsa cut to a ring around the nose, leaving the top and bottom open.

These steps are only my way of building, and the ship does not have to built this way; the main spar is the heart of the airplane and great care should be taken to make it strong and straight. The turtle deck may taper to the fuselage or taper straight back, according to what you like.

Cockpit details that I have used are; pilot in prone position, pilot head, and dummy radio test equipment. The canopy is a sheet of cellophane curved to fit the fuselage and is long and sloping to cut down the drag.

A flier should use 60' to 70' lines. I recommend 60' at a higher altitude and, for windy weather, 70' will work very nicely in lower altitudes and in calm weather.

As you can see from the plan, I use a fairly high degree of engine off set. This you will have to change to fit your flying conditions. Being from Cheyenne, Wyoming, where the wind blows almost all of the time, I have found that off set in the engine is very necessary. My combat ships

(*Continued on page* 62)

STATEMENT OF THE OWNERSHIP, MANAGEMENT, AND CIRCULATION REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946.

(Title 39, United States Code, Section 233)

OF MODEL AIRPLANE NEWS published monthly at Columbia, Mo., for October 1st, 1956.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Jay P. Cleveland, 551 5th Avenue, New York, N. Y.; Editor, William Winter, 551 5th Avenue, New York, N. Y.; Managing editor, none; Business manager, none.

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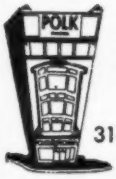

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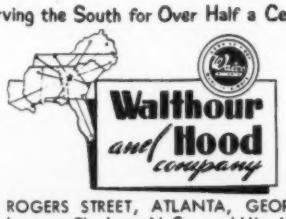

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Deluxe profile U-Control model . . . with a formed bubble canopy. All prefabbed.

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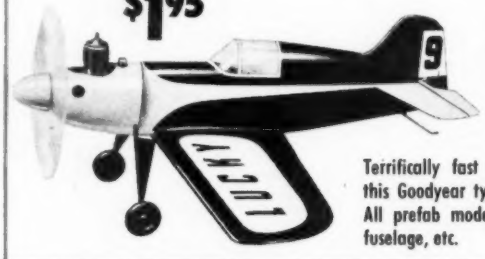

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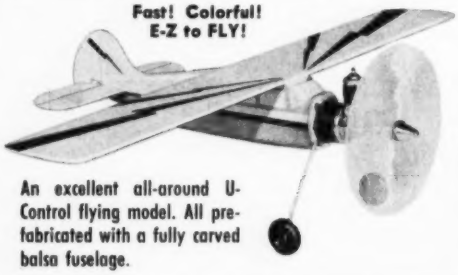

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Exciting fly-it-yourself seaplane! It's U-Control . . . easy to fly and a cinch to assemble from its fully carved fuselage and all prefabbed parts.

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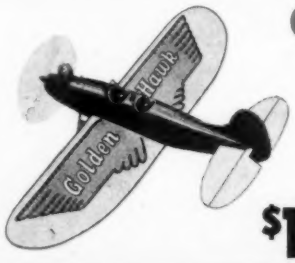

18" WINGSPAN
.035 to .074 ENG.
Extremely C-O-L-O-R-F-U-L flying model with a great big expansive wing. All prefabbed with carved fuselage, etc.

$1.95

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Unusual 'gull' wing gives this U-Control model cool class. All prefab, curved fuselage, etc., etc.

F-94C "STARFIRE" $1.69
SPAN: 18" For .035 to .074 Eng.
U-C model of this sensational 600 m.p.h. jet. Flies like a dream. Prefabbed, carved fuselage.

-Craft "HORNET" $1.95
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ed demon! Semi-scale with our new ' design. All prefabbed. For R/C too.

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Chris-Craft cabin cruiser model (semi-scale) with our new 'Waterama' design. All prefab kit.

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SPAN: 18" For .035 to .074 Eng.
Terrifically colorful all around sport flyer. Practically goes itself. Prefabbed.

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PAN: 18" For .035 to .074 Eng.
U-Control model of this grandaddy of Trophy Racers.' Super-prefab. Profile.

LITTLE STINKER $2.50
SPAN: 16" For .020 to .074 Eng.
Betty Skelton's (Pitts Special) championship stunt flyer. Mighty colorful, all prefab model.

NO. AM. T-28 TRAINER $1.19
SPAN: 18" For .035 to .074 Eng.
Fly-it-yourself version of U.S.A.F. training plane. It's U-Control, a rugged profile flyer. Prefabbed!

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Our exclusive aeronautical design. Prefabbed model has 18" carved balsa hull, etc., etc.

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N: 18" For .035 to .074 Eng.
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SPAN: 18" For .035 to .074 Eng.
Scale model of first U.S. supersonic jet fighter. A terrific flyer. All prefabbed kit.

TORPEDO SPEEDBOAT $2.50
LENGTH: 20" BEAM: 8"
Sleek new speedboat for OUTBOARD engines. Prefabbed, w/ genuine mahogany runner hull.

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Fly-it-yourself version of famous hero of the 'Battle of Britain'. Profile U-Control. Pre-fab.

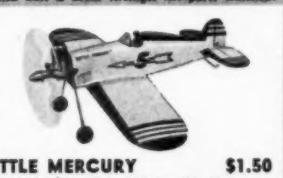
HCRAFT "17" $2.95
N: 16" For .020 to .074 Eng.
prefabbed model has carved balsa formed balsa wings, metal cowl, etc.

RIVIERA $3.50
For "½A" Eng. or Electric Motors
Authentic Chris-Craft replica with 12" carved balsa hull & brass fittings. All parts finished.

FIREBIRD RACE CAR $1.89
LENGTH: 18" For .035 to .074 Eng.
New, futuristic race car that speeds to 60 m.p.h. It's prefabbed, 4 rubber wheels, carved body, etc.

BUCKEYE JR. $3.98
LENGTH: 14" For .020 to .074 Eng.
A "beaut" of a speedboat. Prefabbed with a carved balsa hull, brass fittings, etc.

SPEEDBOAT $1.89
For ½A Engines .035 to .074
speedboat, replica of U.S.N. Convair . All prefab model. Exciting to race!



LITTLE MERCURY $1.50
SPAN: 18" For .039 to .074 Eng.
U-Control carved fuselage model. It's completely prefabbed. A cinch to assemble.

BUCKEYE JR. CABIN $3.95
For "½A" Eng. or Electric Motors
Here's our sleek cabin cruiser, with a commodious cabin, 14" carved balsa hull, etc., etc.

LITTLE MUSTANG $1.95
SPAN: 18" For .020 to .074 Eng.
Famous escort fighter model. Prefabbed. Features carved balsa fuselage, formed balsa wing.

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Send for our new, colorful 1956 catalog. See your dealer . . . or send a postal card.

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usually have from 10 to 15 degrees off set so that they will be tight on the lines at all times.

I believe that any one who builds his airplane will find that he has a strong, light, hot stunter or combat ship that should satisfy his wants and needs as far as stunting goes. As for looks, I can only say that I like it and that I think it should compete with the best. I have not tried to make this a semi-scale stunter because I could not find a scale ship that would give me what I wanted.

MAN at Work

(*Continued from page 4*)

wing there will be limited to 44 inches. Look for more complex maneuvers to replace some of the old stand-bys in precision acrobatics. In combat, kills will be scored to the second by stop watches and longer streamers will be used to cut down collisions. We hope!

• • •

► Hear that the SMAE, Britain's counterpart to the AMA, suggested to FAI that there be no change in A-2, or Wakefields, but that motor run in power be cut to 12 seconds. It is said that, if something is agreed upon at the FAI meeting, everybody will be asked to fill out a card vote. Changes, if any, would be deterred to 1958 and then would not be touched for four years. The situation intrigues us. Is it typical of the business that, reputedly, there isn't an active competitor on the SMAE Council? Does FAI really know that the tail it holds is attached to a bull? Four years! Card vote? Sounds like the Aesop fable of the old man, the boy, and the donkey.

• • •

► Although it's been about 20 years since a magazine could hope to report contest results—a glance at a summertime contest calendar suggests why, MAN at Work receives bushels of results from contest directors and club secretaries the land over. Read them all, fellows, but it is impossible to print them . . . Wonderful samples of a Corsair plan, first of series for scale fans, to be printed by Superscale, 1701 Grace St., Arlington, Tex. The Mustang P-51C and North American T6-G are available, Aero Commander and Grumman F7F-1 in the works. Scale is 3/4 inch, blue printed on 24 x 36 inch sheets, $3 the set. E. R. Atkins, there, has done some keen stuff for the mags. If all the plans are as detailed and as authentic as the Corsair, the man has something . . . Cliff Montsplaisir innocently mentioned that he had a string of 11 consecutive max's in FAI and Wake. Can't forget it was Cliff who weighed every piece of wood, including cross pieces, in his Wakefield . . . Suspect M. J. McManus, Craft Models, Fitchburg, Mass., is trying to convert us to boats. Got stranded with Mac for seven hours waiting for an ultra modern airliner and ever since, finished, semi-finished, and kits of boats keep sailing in. The kids like 'em, no question . . . World Engines has a glossy paper, 24-page book called International Engine Review, consisting of detailed reports on foreign engines from reviews by Peter Chinn in his monthly feature in Model Aircraft and Model Engineer, two British mags. Three-views, pix, dope, graphs, for 35c . . . And, at 75c, Hobby Tools and how to Use Them, by X-Acto, a 96-pager . . . Low-cost briefing on the model airplane hobby can be had for 35c. First, send 10c to the Academy of Model Aeronautics, 1025 Connecticut Ave., Washington, D.C. and tell them you want a copy of the rules book. Then send

35c to America's Hobby Center, and say you want their giant catalogue. The AHC catalogue has 64 pages of illustrations, showing just about every plane, boat, motor, gadget, made in recent years. A birdseye view of the field if there ever was one. The rules book indentifies every type of competitive model, gives rules influencing design and operation. Between these two booklets, the beginner can get a flying start on his new hobby.

• • •

► Mail order team race between Galesburg, Ill., and the FAST Club in Calif., was rough on the boys from Abe Lincoln's state. It was windy, gusty and rainy. Contest was run under AMA rules and, surprisingly enough, says the reporter, no hitches developed. What the heck was expected? How much justification is there for special local rules? And we don't mean just Galesburg! So far, no one appears to have figured out who won but it was "lots of fun," . . . For hard-to-get items try Swaney's Hobby House, 527 East 55 St., Long Beach, Calif. Swaney never tells us these things, but read them in club papers, this one from the Montreal Model Flying Club. No put-up job, this plug! Nichrome wire, real Jap tissue, 3-5 pound indoor wood, aniline dye, taper sawed indoor wood. Indoor kit with microfilm solution and rubber, DT fuses, etc.

Import Review

(*Continued from page 36*)

ordinary plain bearing, shaft-valve 1.5 c.c. Diesels when loaded for speeds below 10,000 rpm, this new Taifun is actually one of the fastest turning Diesels yet produced and, on our test, delivered .16 bhp at an exceptional 16,000 rpm. Total weight is 3.8 oz.

Super-Tigre G.29

The Italian Super-Tigre motors need no introduction to M.A.N. readers, who know them as products of one of the oldest established and most respected of European manufacturers.

The .049 cu.in. G.29 is a Diesel, but is otherwise somewhat in the tradition of American half-A's. It is compact, looks rather like an Atwood and revs like one. It has a stroke/bore ratio of only 0.77/1, weighs 1.65 oz. and uses a ball joint in place of a wrist pin.

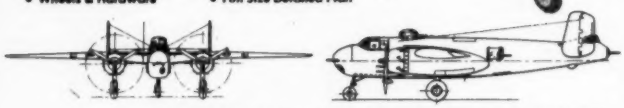
The motor is built around a pressure cast crankcase and main bearing unit, into which the cylinder liner is screwed. The cylinder has two diametrically opposed exhaust ports and two inclined bypass ports leading from an annular chamber which, in turn, is fed via three passages in the crankcase wall. The crankshaft is exceptional in that it has a journal of 6:5 mm. diameter, or over ¼ in. (A few years ago a ¼ shaft was considered adequate for a .29) This, combined with a stroke of only 8.5 mm. and a 3.5 mm. crankpin, means that the journal and crankpin actually overlap, a not uncommon feature of full size high-speed engines, but unusual in a model.

It is a characteristic of all small engines that, whereas the specific output (i.e. power per unit of piston displacement) of a glow engine falls off sharply when displacement is reduced to the .049 sizes, the diesel maintains an almost constant level. Thus, on test, we found the G.29 an exceptional performer by normal half-A standards, especially on above-average sized props. Peak output was realized at just over 15,000 rpm where output was .068 bph.

TWIN ENGINE BOMBER

- Carved & Hollowed Fuselage
- Carved & Hollowed Nacelles
- Formed Metal Engine Cowls
- Complete Full Color Decals

- Formed Canopies & Turrets
- Wheels & Hardware
- Pre-fabricated Balsa Parts
- Full Size Detailed Plan



For .09 to .019 Engines — ¾" Scale — Big 42" Wingspan — 33" Overall

All Balsa Construction — No Paper Covering Required!

Pre-Fabricated *Controlinars*

Embodying the finest in design, with completeness found only in a Berkeley Kit, these models will satisfy the exacting modeler

Berkeley's

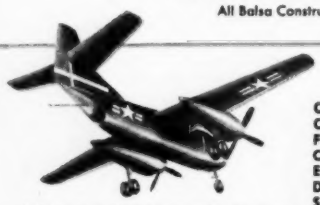
North American

$12.95 **B-25 "MITCHELL"**

General Jimmy Doolittle's Historic "Tokyo Raider"

- 3-WHEEL RETRACTABLE SHOCK MOUNTED LANDING GEAR
- OPERATING WING FLAPS

With twin engines screaming, the B-25 roars across the field. In 100 feet it's airborne and the gear retracts. With lessened drag and increased speed, it's responsive to every control. Who can tell it from its prototype as throttled down, it settles in for a power on landing, flaps down, gear down and locked. Individually shock mounted gears flex upward and rearward on impact. Gun the engines and off you go again. Perfect for the Navy Carrier event, this detailed scale replica is easily assembled from this masterful kit.



Scale jet air intake for Jetex cooling, thrust augmenter . . . No access hatches to mar finish. Jetex unit slips out scale size jet exhaust opening with ease . . . Full depth ply wing spar plus sheet planking amply support engine nacelles under landing impact.

KIT FEATURES:

Carved & Hollowed Fuselage!
Carved & Hollowed Nacelles!
Five Metal-Hub Rubber Wheels!
Complete Decals!
Embossed Bubble Canopy!
Deep-Drawn Metal Engine Cowls!
Shaped Leading & Trailing Edges!
Die-Cut Ribs, Bulkheads, Etc.

We urge you to see this kit. Few airplanes lend themselves to model work as well as this Atomic Carrier Bomber. It is designed for active flying, with none of the usual frailties. Carved fuselage and nacelles make it very easy to assemble. Climbs on one engine, uses Jetex (internally mounted) for scale effect and reserve power only. Perfect scale throughout!

$6.95

For two .045 to .099 Engines plus Jetex 100, 200 or Jetmaster 150 unit, for exact scale power. 27" Wingspan — ¾" Scale from factory plans.

(Jetex unit for reserve power & scale effect)

North American

AJ-1 "SAVAGE"

U. S. Navy Atom Bomb Carrying Fighter!

(No deviations from scale on this model)

Composite powered Navy carrier-borne Attack Bomber capable of carrying an Atomic Bomb. Power Plant consists of two 2,400 h.p. Pratt & Whitney engines and one 4,600 lb. thrust J-33 Allison turbojet. The turbojet is used for accelerated take-off and combat. Maximum speed with jet power is 425 m.p.h.

PERSONAL AIRCRAFT

$5.95

CESSNA "195"

.19 to .49 Engines
36" Wingspan

This beautiful lightplane features Step-Keel construction. Formers are positioned by a removable jig. Metal cowl, die-cut parts.

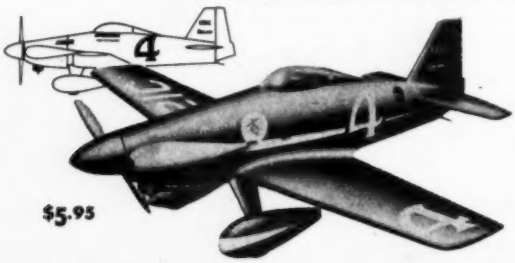
U.S.A.F. designation LC-126A. This five place cabin monoplane was designed for business flying. The Air Force has used the "195" for Arctic rescue work fitted with ski landing gear. 300 h.p. Jacobs engine. Maximum speed 180 m.p.h. — 165 m.p.h. cruising.

$5.95

"SHOESTRING"

.14 to .36 Engines — 28" Wingspan

This Continental Trophy winner makes a perfect controline kit includes metal hardware; formed metal wheel pants; metal spinner; formed sheet metal landing gear; metal bushed rubber wheels; die-cut balsa; plastic bubble canopy; fuelproof decals; hardwood mounts; die-cut plywood; covering material; full size detailed plans.

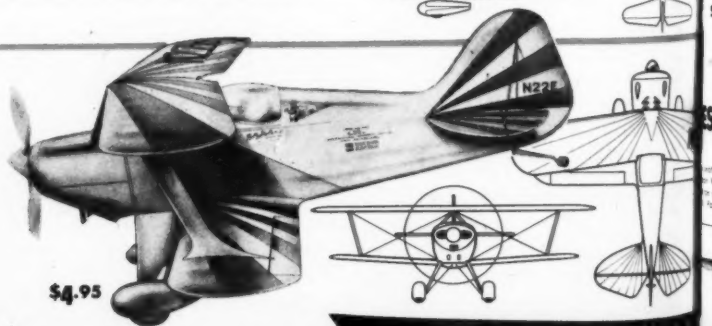


$5.95

"MINNOW" Cosmic Wind

For .09 to .36 Engines — 28" Wingspan

Probably the most famous Goodyear Racer of all. Step-Keel Fuselage, wheel pants, metal spinner, cowl, complete decals, canopy, U-Control.



$4.95

Betty Skelton's "PITT'S SPECIAL"

For .19 to .33 Engines — 25½" Wingspan

This colorful stunting biplane stands apart on any field. Decals include red flare design. Metal cowl, wheel pants, celluloid, etc.

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at every Nationals' for the last 18 years!!

We are proud of this extraordinary record.

1" = 1' Scale . . . For Free-Flight . . . Controline . . . or Rubber Power!

For .035 to .049 Engines Free-Flight . . . .049 to .099 Engines Controline (except as noted)

$2.95

PIPER "SUPER CRUISER"

35" Wingspan

Three place cabin monoplane originally introduced as the "Cruiser" in 1940 with 75 h.p. then as the "Super Cruiser" after World War II, with 104 h.p. and then in 1948 as the four place "Family Cruiser". "Super Cruiser" had a maximum speed of 115 m.p.h.

$2.95

1¼" Scale

37½" Wingspan

"BUHL PUP"

The "Buhl Pup" has been immortalized as one of the finest light planes ever designed. A number of full scale "Buhl Pups" are being rebuilt by "old timers". This truly different design makes an exceptionally realistic and fine flying model.

$2.50

CULVER "V"

29" Wingspan

This low-wing sport plu... turns in long stable flights.. The tricycle landing gear adds realism to landings.

Each Kit Contains:

- Authentic Multi-color Decals
- Formed Gear, Rubber Wheels
- Die-Cut Balsa and Plywood Parts
- Metal Hardware and Covering Material
- Full Size Berkeley Detailed Plans!

$2.50

TINSON VOYAGER "150"

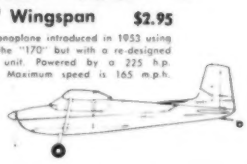
34" Wingspan

Originally built by Stinson division of Consolidated Vultee. Added to the Piper line in 1948. Four place 165 h.p. Franklin engine. 145 m.p.h. maximum speed.

CESSNA "180"

35" Wingspan $2.95

Four place cabin monoplane introduced in 1953 using the same wing as the "170" but with a re-designed fuselage and tail unit. Powered by a 225 h.p. Continental Engine. Maximum speed is 165 m.p.h.



COLONIAL "SKIMMER"

(Not for Rubber Power) 33½" Wingspan

The hull design is perfect for realistic water take-offs.

Three place amphibian with retractable landing gear. Nose wheel protrudes when retracted to serve as a bumper. Powered by 125 h.p. Lycoming. 125 m.p.h. $2.95

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ESSNA L-19 "BIRD DOG"

36" Wingspan

...t observation plane used on a large scale in ... War by the U.S. Army and the U.S. Marines. ... number of these are used by National Guard ... Powered by 213 h.p. Continental—130 m.p.h.

$2.50

STINSON SENTINEL "L-5"

33½" Wingspan

Two place liaison and observation plane first flown in 1941. 1731 L-5's were built during World War II. Still in use by the U.S.A.F., Italian Air Force, and the Japanese Air Defense Force. Powered by 190 h.p. Lycoming. Maximum—129 m.p.h.—112 m.p.h. Cruising.

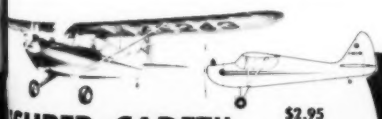
$2.50

"AERONCA SEDAN"

34" Wingspan

Four place light cabin monoplane. Powered by 145 h.p. Continental engine. Speed—129 m.p.h.

Featured as a landplane, plans show pontoon details for those desiring the added thrill of water take-offs. Finished model is really spectacular.



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35" Wingspan

...s the "Interstate Cadet" before World War II ...ently built by Call Aircraft Co. Two place— ...ers 65 h.p. It is now stepped up to 125 h.p. ...n increase in maximum speed to 135 m.p.h.

$2.50

FAIRCHILD 24 "RANCHER"

36½" Wingspan

First produced in 1933 as a two-seater, in 1938 was introduced as a four place model using either a radial Warner engine or an in-line Ranger. Military version was known as the YC-61 "Forwarder" by the U.S.A.F. and the "Argus" by the R.A.F. Production resumed for business use after the war. 132 m.p.h.

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